

Morning Star

Summer 2017



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New Members

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

Casey Ammon
Damian Delonay
Steve Grimsley
Bill Wooden
Renzo Silva
Casey Percell
Jim Williams

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 10

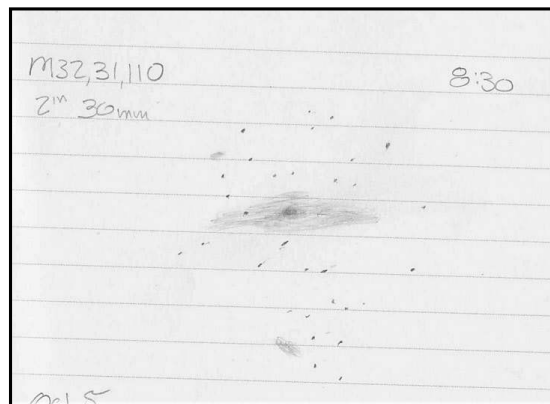
Messier Objects,
Photos & Observing
By Joe Comeau
& Angele Mott-Nickerson

Although the Messier objects were considered a time wasting problem for comet hunter Charles Messier, they remain a source of wonder and beauty for both amateur and professional astronomers. Messier's final list included 103 objects. Astronomers and historians discovered evidence of another seven objects that were later observed either by Messier or by his friend and assistant, Pierre Méchain. These seven objects,

M104 through M110, are now accepted by astronomers as "official" Messier objects.

The list includes star clusters, galaxies and beautiful nebulae. They are visible from the northern hemisphere since Messier observed mostly from Paris.

Rediscovery of the 110 objects presents a rewarding challenge. We will discuss the perspectives of an observer and of a photographer. Drawings made after star hopping and patiently viewing through an eyepiece reveal the complexity of the objects and show how much can be seen if one takes the time to look. Astrophotography over a twelve year period shows great detail in full color. Collaboration through the project has influenced both of us in many positive ways.

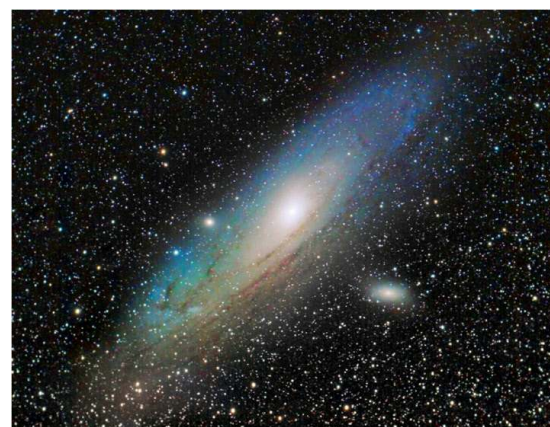


Andromeda Galaxy as sketched by Angele



Still a good time to view Jupiter. Here's a stack of 6 images from Peter Gillette. There are three moons present, Io and Europa on one side, and Ganymede on the other. 8"SCT with a 4X TeleVue Barlow. The sky conditions were less than ideal. Paul enhanced the moons to make them visible.

Don't forget to Saturn, currently low in the SE in the evening.



As imaged by Joe

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) Events page.

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

Contact: 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, 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 in being on this list contact info@vtastro.org

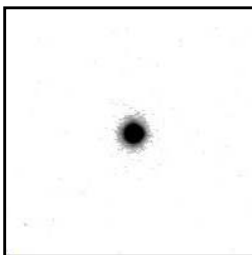
See details below and on the following pages

August 7

**Collimation of a Schmidt-Cassegrain
using
"GoldFocus Plus Collimation System"
By "Rev"
(i.e. Bill Wick,
Norwich University Chaplain)**

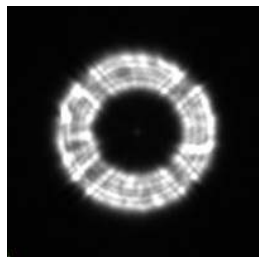
"Collimation" ("collinear" or 'in-line') means that all optical elements of a telescope are centered and square to its optical axis and its imaging system. Lenses must be accurately spaced; primary and secondary mirrors must be accurately separated and aligned; focal reducers, field-flatteners, field correctors and focus draw tubes require accurate alignment (centered/moving parallel to the optical axis); additionally, filter holders need to be well-centered. NOTE: the mirror grinding error on the Hubble Space Telescope (HST) primary mirror (later fixed and subsequently serviced by four Space Shuttle crews) was off as little as 4 micrometers (microns) at the edge of a 2.4 meter (94.5 inch) mirror.

A number of collimation options exist including (but not limited to):



1. "By Eye" or "Star Collimation" in which one relies upon experience and judgment to achieve good collimation (making a star image as small,

round, and sharp as possible. This technique is subjective with accuracy diminished by diffraction limits and atmospheric conditions.



obstruction (e.g. [Newtonian] reflectors or catadioptrics [Schmidt-Cassegrains]) whereby in the presence of poor collimation a severely defocused star image shows an elongation or off-center distortion. One adjusts the secondary mirror so as to make the defocused star image as round and symmetric as possible. This technique is also subjective (it can be a difficult to visually determine when

2. "Defocused Star" or "Concentric Ring" Collimation utilizing a defocused star image is used for telescopes having a secondary mirror

the defocused star image is perfectly round and symmetric).



3. Cheshire (external light source) and/or Laser Collimation (built-in laser) employs instruments whose accuracy is limited to one or two millimeters and by the accuracy of alignment in the eyepiece holder.

"Rev's" presentation will highlight the "GoldFocus Plus Collimation System" he uses for focusing and collimating his Celestron 11" SCT. The system involves a GoldFocus Plus Collimation Mask and Analysis Software which measure collimation in the same way a CCD-camera forms its image with the requisite accuracy for high quality digital

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

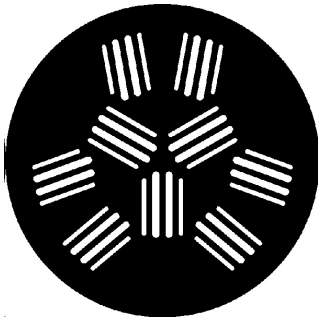
Public Events

We have requests from several entities for presentations and/or observing events. Members interested in helping or for more info Contact:
info@vtastro.org

Member and Invited Guest Star Gazing and other events

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

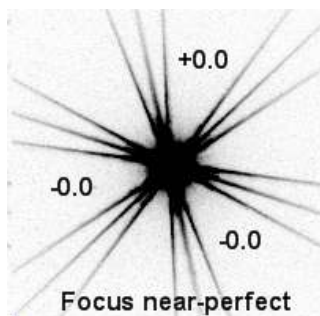
Contact info@vtastro.org



imaging. GoldFocus Analysis Software displays the objective measure of an image's quality of focus and collimation on one's

computer screen in real-time. NO GUESSWORK - focus and collimation

qualities are objective and accurate - neither limited by diffraction limits nor conditions. This system (mask and software) ensures prop-



er focus and collimation (in the exact way that one's astrophotography imager sees.

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

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 Battle-
field - Solar, Deep Sky Night

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

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

September 11

Cutting Edge CubeSat Space Technology in Vermont By Ryan McDevitt, Ph.D.

When most people think of Vermont, they have visions of rolling hills, dairy barns, cows in picturesque pastures. But tucked away here and there you will also find state-of-the-art science and engineering.

One such place is GreenScale Technologies. Here, Ryan and a team of researchers, engineers and entrepreneurs work on cutting edge technologies for the CubeSat market. Ryan will present some of the work they are doing on microscale propulsion, heat transfer and mass transport. He will also present information on the broader CubeSat field.

Ryan McDevitt co-founded GreenScale Technologies with Matt Shea in 2014 to continue work begun at the University of Vermont. Ryan is a mechanical engineer specializing in computational and experimental studies of micropropulsion and thermal management systems.

GreenScale Technologies was selected as a 2016 University of Vermont SPARK VT Awardee. Ryan McDevitt,

in partnership with University of Vermont Professor of Mechanical Engineering Darren Hitt, was awarded the SPARK VT award to develop and commercialize the GST-M125 micropropulsion system.

Visit their web site at
www.greenscaletechnologies.com



GST-M125 Propulsion System in a 3U CubeSat

Image Credit: GreenScale Technologies, LLC.

Articles

Building My Observing Chair By Jack St. Louis

May 6th was the 53 Anniversary of the founding of the Vermont Astronomical Society. I celebrated that day

building observing chairs with Dennis Woos and Fred Cyr at Keith Lawrence's house. Keith had all the components prepared and tools ready for assembly in his workshop, providing directions and guidance as we built our chairs. Dennis had already built a chair but wanted a taller chair to accommodate his larger telescope.



Following Keith's printed assembly procedure, we assembled three chairs together, helping each other, sharing tools, glue, clamps and hands as all parts came together. Keith's design provides an excellent portable chair, lightweight and elegant. The seat adjusts with ease and firmly secures at 15 heights to allow comfortable viewing for most of us with our variety of telescopes. Two well thought out important features are the handle on top of the chair and the efficient and secure aluminum folding link holding the front and rear stiles in place during use. The link drops in place as the stiles are opened, a quick lift up by the toe and the link folds up in place as the chair is closed.



The pine wood all sanded and free of ugly knots, adequate and comfort-

able seat, overall design and functionality come together to provide a comfortable observing experience at your telescope while viewing your favorite objects or working on your certificate program.

A great chair is a critical piece of equipment, as important as your optics, for enjoyable viewing of the wonders of the night sky. If you do not have an observing chair, you should make one!



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-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 website be added to your club's web page."

The Fizzy Seas of Titan

By Marcus Woo

With clouds, rain, seas, lakes and a nitrogen-filled atmosphere, Saturn's moon Titan appears to be one of the worlds most similar to Earth in the solar system. But it's still alien; its seas and lakes are full not of water but liquid methane and ethane.

At the temperatures and pressures found on Titan's surface, methane can evaporate and fall back down as rain, just like water on Earth. The methane rain flows into rivers and channels, filling lakes and seas.

Nitrogen makes up a larger portion of the atmosphere on Titan than on Earth. The gas also dissolves in methane, just like carbon dioxide in soda. And similar to when you shake an open soda bottle, disturbing a Titan lake can make the nitrogen bubble out.

But now it turns out the seas and lakes might be fizzier than previously thought. Researchers at NASA's Jet Propulsion Laboratory recently experimented with dissolved nitrogen in mixtures of liquid methane and ethane under a variety of temperatures and pressures that would exist on Titan. They measured how different conditions would trigger nitrogen bubbles. A fizzy lake, they found, would be a common sight.

On Titan, the liquid methane always contains dissolved nitrogen. So when it rains, a methane-nitrogen solution pours into the seas and lakes, either directly from rain or via stream runoff. But if the lake also contains some ethane—which doesn't dissolve nitrogen as well as methane does—mixing the liquids will force some of the nitrogen out of solution, and the lake will effervesce.

"It will be a big frothy mess," says Michael Malaska of JPL. "It's neat because it makes Earth look really boring by comparison."

Bubbles could also arise from a lake that contains more ethane than methane. The two will normally mix, but a less-dense layer of methane with dissolved nitrogen—from a gentle rain, for example—could settle on top of an ethane layer.

In this case, any disturbance—even a breeze—could mix the methane with

dissolved nitrogen and the ethane below. The nitrogen would become less soluble and bubbles of gas would fizz out.

Heat, the researchers found, can also cause nitrogen to bubble out of solution while cold will coax more nitrogen to dissolve. As the seasons and climate change on Titan, the seas and lakes will inhale and exhale nitrogen.

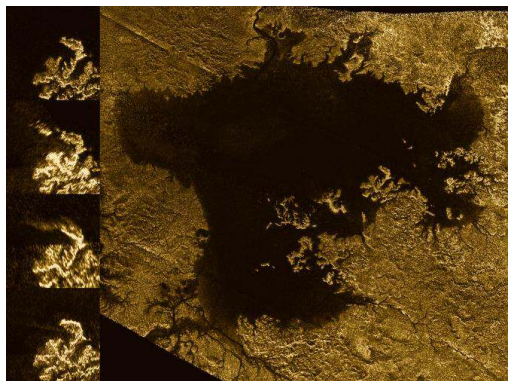
But such warmth-induced bubbles could pose a challenge for future seafaring spacecraft, which will have an energy source, and thus heat. "You may have this spacecraft sitting there, and it's just going to be fizzing the whole time," Malaska says. "That may actually be a problem for stability control or sampling."

Bubbles might also explain the so-called magic islands discovered by NASA's Cassini spacecraft in the last few years. Radar images revealed island-like features that appear and disappear over time. Scientists still aren't sure what the islands are, but nitrogen bubbles seem increasingly likely.

To know for sure, though, there will have to be a new mission. Cassini is entering its final phase, having finished its last flyby of Titan on April 21. Scientists are already sketching out potential spacecraft—maybe a buoy or even a submarine—to explore Titan's seas, bubbles and all.

To teach kids about the extreme conditions on Titan and other planets and moons, visit the NASA Space Place:

<https://spaceplace.nasa.gov/planet-weather/>



Caption: Radar images from Cassini showed a strange island-like feature in one of Titan's hydrocarbon seas that appeared to change over time. One possible explanation for

this "magic island" is bubbles. Image credits: NASA/JPL-Caltech/ASI/Cornell

Along the Meridian

(A continuation from the last issue)

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.

The time & location when an object is highest in the sky, providing the best view, is along the Meridian.

I used Stellarium, and set the date to July 15th and the time to 9:00pm:

Looking directly South, Jupiter is to the West of the meridian, about 30 degrees above the horizon, Saturn is to the East of the meridian, about 20 degrees above the horizon. Changing the time to 10:00pm clears sunlight from the sky revealing the constellations. Now looking along the meridian, Scorpius is just above the horizon, bisected by the meridian. To the West of bright Antares you can see globular cluster M4, to the North West of Antares is M80, another globular cluster.

Higher along the meridian is the large Constellation Ophiuchus, with globular cluster M12, almost 45 degrees above the horizon. A little South East of M12 is M10, further to the West is M14. Almost directly overhead is the constellation Hercules, with the beautiful globular cluster M13, practically on the imaginary meridian.

Looking to the North, the wonderful Double Cluster lies to East, or right, of the meridian, easily found in even in small telescopes. Higher in the sky, also East, is Cassiopeia with open clusters M52 and M103. To the left, or West, is Ursa Major, containing the asterism The Big Dipper. The stars at the bend of the dipper's handle is the naked eye double of Mizar and Alcor. In the telescope, Mizar shows itself as a double.

Changing the date to August 15, the sky is already darkening by 9:00pm, showing Saturn to the West of the meridian, Jupiter is close to setting over

the Western horizon. The sky is dark by 10:00pm, showing Sagittarius just over the horizon and bisected by the meridian. There are many M-objects located in Sagittarius, open and globular clusters and nebulae, refer to your favorite star chart or observing guide to locate them.

Higher in the sky and also along the meridian is the small constellation Lyra containing the Ring Nebula, M57, and the Epsilon Lyra, the famous double-double star. In small telescopes, M57 appears very small, like a fuzzy star, higher magnification may show the ring itself. Epsilon needs high magnification to fully resolve the doubles of the double. M13 in Hercules is now to the West of the meridian, to the East is Cygnus, with the beautiful double Albion, the head of the Swan. Low to medium magnification will reveal wonderful sights of the Milky Way along the length of Cygnus. Also to the East of the meridian, between the small constellations of Vulpecula and Sagitta, can be found the planetary nebula M27, also known as the Dumbbell Nebula.

In September, the stars come out by 8:00pm, Jupiter almost set in the West, Saturn to the West of the meridian and low in the South. By 9:00pm, the sky is dark for viewing, the sky has shifted to the West, Cygnus now lies on the meridian, Lyra, Hercules and Ophiuchus all to the West of the meridian. In the East approaching the meridian are Pegasus, Delphinus, Aquarius and Capricornus.

Pegasus contains the nice globular cluster M15, much further to the East in Andromeda is M31, the Andromeda Galaxy. The Eastern most star in Delphinus is a nice double, appearing as the eyes of the Dolphin. Aquarius has the globular cluster M2 and the planet Neptune. Capricornus contains the globular clusters M30 and M72, open cluster M73.

Of course, you do not need to wait for your favorite objects, or those on your VAS certificate list, to get close to the meridian, most of us do not wait for that, but along the meridian is where you will be the best view. As long as there are no clouds.

A Busy Field (M 88, 90, 91, etc)

By Dr. Michael Stadtmauer

I'm not sure if you've noticed, but its been a little cloudy lately. Plus, I had to send my Stellarvue 80mm triplet refractor in for re-collimation, so there has not been much time for imaging.

However, I did manage to get a night in in early April that was really more about doing testing and tweaking of my mount and working on refining my guiding (What's guiding, you say? [Skip this if you know] Guiding is the use of a secondary camera whose sole job is to focus on a single star and keep that star centered by sending messages to the mount about how to move to keep the star as still as possible. This makes long exposures much more sharp than they would be otherwise; but it can be a bit of an art to get the settings optimized).

Anyway, in between adjusting this and trying that I managed to get 11 300s (5 minute) frames in each of LRGB, a total of 3hrs, 40min - not a very long time for images like this. It really needs another full night's worth of data. The image was also made before the scope was sent in, so the stars look... wrong for a refractor, esp one that now has almost perfect collimation (.986 Strehl for those who care). Given that the data, for many reasons, was not fantastic, although still light years beyond what my old system could produce (no, really - its got objects light years beyond what I could capture previously..... couldn't resist), it became an interesting exercise in trying to get the most out of the data by isolating the galaxies and enhancing/brightening them without doing the same to the background, which would end up in a noisy grey soup of a sky. This requires the use of masks.

Masks are essential to the processing of astro images. In almost all cases, you want to treat the background and the objects in exactly opposite ways. However, in a busy image like this, isolating just the galaxies is not an easy task. Most programs, or at least the one that I use (PixInsight) creates masks based on pixel values, i.e. brightness. So, you can choose a range of brightness values to be turned into a mask. In this way, you can create a mask of only the brightest objects, but this will, of course, include both the desired objects and stars (which tend to be pretty bright :)). The "Luminance mask" looks like this:



This kind of mask is useful for some things, but for our purposes it will not do because if you brighten the stars to the same degree that you want to brighten and enhance the galaxies then you will over saturate the cores of the stars, which darkens them and creates the dreaded 'donut hole' appearance. So, we have to get rid of the stars. You could go through the image with an 'eraser' and blot them out. It would be tedious, but it could be done. BUT, often you will have stars over objects of interest. These must also be masked, but you can not see them in the above image, the Lum mask, because they will blend in with the brightness of the galaxy behind. Therefore, we have to make a map of all the stars and then subtract that from the Lum mask in order to properly and exactly mask all the stars in the image. Luckily, stars have (or should have) a pretty distinct shape and so a well written algorithm can find and select those shapes to create a new mask that is only stars. It looks like this:



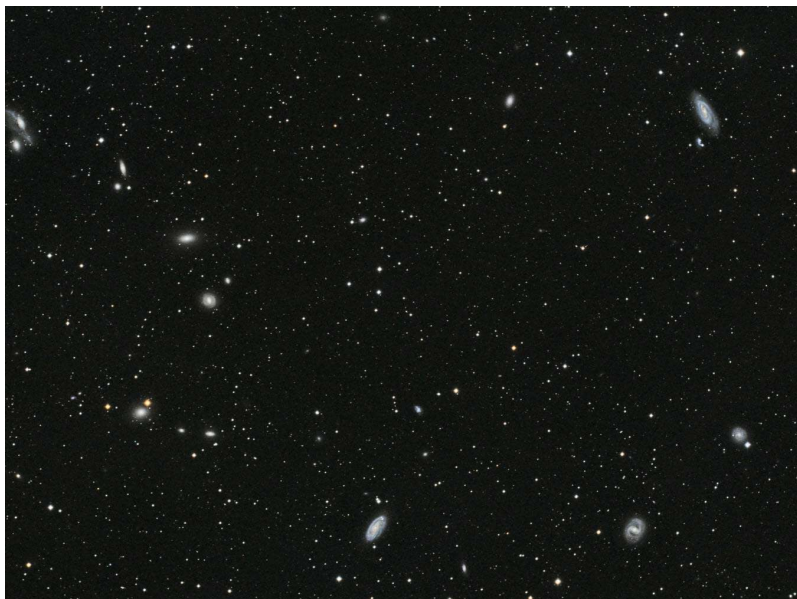
PixInsight is a very algorithm/math based program and has a tool called PixelMath, which is pretty literal in what it does. You can enter mathematical equations, using the images as 'digits' to manipulate your data in ways only constrained by the laws of mathematics (which leaves you with a 'number' of options (I got a million of 'em)). So, in our case, we need to, quite literally, subtract the star image from the entire luminance field, leaving behind only the galaxies that are not perfectly round. In PixelMath we enter: `lum_mask - star_mask`. That's it - press go and out pops this:



Well, more or less. It requires a bit of clean up, but the above is the desired result. Now, as it happens, there was not a single significant star over any of the galaxies, but that is very unusual. If there were, you'd see a black spot somewhere in the galaxy field, which would protect the star from the brightening effects you want to apply to the galaxy. Using the mask above, we can freely experiment on the galaxies - poking and prodding, stretching, brightening, sharpening, playing with contrast, etc in order to try to peek out every last detail. I don't know if I've done that here, but I had fun trying. Here is the raw combined LRGB data before any refinement:



And here is the finished image, after applying the masks above in both a positive and negative fashion (we can invert the galaxy mask above to exclude the galaxies from the darkening and smoothing of the background, for instance) and using all sorts of tools to try to enhance the meager amount of data collected:



Technical Info:

11 x 300s L,R,G,B at f/4.8

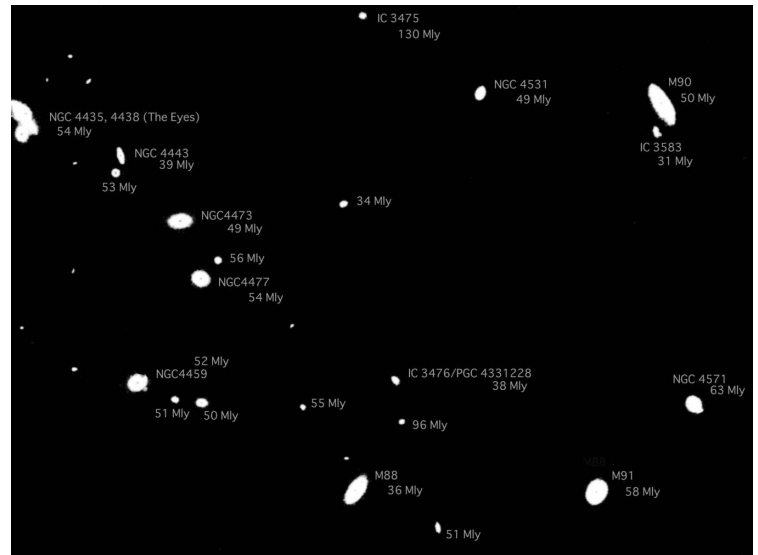
Scope: 80mm APO triplet, SV80ST, .8x reducer/flattener

Camera: QSI 683 wsg-8

Mount Paramount MyT

At this size, its hard to really see what's going on and I invite you to look at my Astrobin page for the full size version,
<http://www.astrobin.com/users/drmikevt/>

As I mentioned, this is a busy image containing not less than 40 galaxies. On the left, the tail (or head... who's to say?) of Markarian's Chain is present, starting (or ending) with the Eyes. M88, 90 and 91 on the right side are not considered a part of the chain. I chose this framing to try to get as many interesting galaxies in the image as possible. Below is the galaxy mask labeled with the major players, along with their distance from us (exact, to within a few million light years).



This field, in Virgo, represents a piece of the much larger Virgo Cluster, an enormous group of galaxies in the 50-80 million light year distance that interact over vast expanses. Some are closer, though: The “Eyes”, for instance, are only about 100,000 light years apart and have been as close as 16,000. M87 (not pictured) is the grand conductor of the dance, a supermassive galaxy at the heart of the cluster. M90 is thought to be escaping the cluster and is approaching us at 383km/sec, a relative speed differential of 1500 km/sec compared to the general cluster. M88, however, is on an elliptical orbit that is currently taking it towards the core of the cluster. M91 is about the same diameter as our Milky Way, 100,000 light years. But, this is very large for a barred spiral type galaxy. Seeing a cluster like this, you might be tempted to visualize them as all sort of rotating around as if on a sphere, but they are really all on their own elliptical orbits carrying them in and out of the core, sort of like an... atom.

The winner in terms of distance is the upper small IC 3475 at 130Mly. On earth, this corresponds to the end of the Jurassic period and the evolution of the first birds and flowering plants. Dinosaurs were at their height when the photons captured on my sensor were ejected into intergalactic space. Cool.

If anyone has any questions or just wants to chat about astrophotography, don't hesitate to get in touch through my [Astrobin page](#).

Board Talk

Board meeting summaries:

April

Jack reminded the officers we need reports from them at the Annual Meeting in May.

The 4 Board Member at Large, Treasure and Secretary positions are up for election. The current members will run for re-election.

Angele is working on updates to the VAS Brochure (for handing out at events). We discussed few more changes.

We decided to have a Board Meeting in May (typically we don't).

Joe will be having his "Spontaneous Night Under the Sky" again this year (probably in August).

We will be having another Astrophotography Workshop this year. The date has not been set yet.

Discussed the length of the monthly meeting. There has been some feedback that primary portion is too long, going past 9:00. One suggestion was to "save up" some of Mark and Bob's mini-presentations for a main presentation.

The Site Committee is proposing we build the new building for the 18" Obsession. Put the donated 14" Newtonian & Byers mount in the old building or modify the old building for the Russell Chmela scope.

The Membership Committee has been busy though the weather swamped the Messier Marathon. 7 more observers chair to make as part of the "Makers Day".

Doug has updated the VAS Resource List with depreciated values.

Annual Business Meeting (May)

Jack opened the Business part of the meeting. He thanked the St. Johns Club personnel for a great meal.

Cheryl Lawrence's name was picked for the Brunch with the President monthly drawing (usually done at the monthly meeting which of course there wasn't on for May).

Jack gave the **President's Report:** He announced to the members that the Town of Hinesburg want to move our building. They want to move the trans-

fer station from the town garage area (down over the edge from of our observatory) to the spot we are occupying. Jack and a couple other Board Members will meet with the town on Tuesday (day after the Annual Meeting). [Update - it is not known just how long but we may have a year or more. Everything is still in the initial planning stage. May move us up on the Landfill cap, northwest of current site, they are checking with the EPA as to whether that's allowed now. May be able to move west, just south of the cap].

VAS will be [was] 53 on May 6.

2017 was a busy year for the VAS. Jack listed off all the presentations and observing events hosted by us.

Paul gave the **Secretary's Report:** We had 80 paid up members as of 12/31/16 compared to 84 the year before (memberships go from January 1 to January 1). We had 7 new members in 2016. Year to date we have 7 new members this year.

Doug Williamson gave the **Treasurer's Report:** Income was about \$1,100 more than expenses. Members can contact any board member to request additional financial details.

Keith gave the **Membership Committee Report:**

Committee Members:

Keith Lawrence, Chair

Mark Moyer

Angele Mott Nickerson

Dennis Woos

Steve Quigley

Ray Harvey (resigned spring of 2017)

Jack St. Louis, ex officio

He listed many of the member and public events put on with the help of several members. He reviewed the feedback received via the membership survey put out last Spring.

Keith gave the **Observing Site Committee Report:**

Committee Members:

Keith Lawrence, Chair

Gary Nowak

Jim Bosek

Doug Williamson

Jack St. Louis, ex officio

We cut back the trees and bushes on the East, South and West horizons.

Removed 100 nearby old tires.

Supported the work of the Russell Chmela Observatory Committee.

Watching what may happen concerning the how some proposed development (on the Goodrich Land) North of the site may affect the site.

Elections for Treasurer, Secretary, and 4 Board Members at Large were held. Doug Williamson was re-elected as Treasurer, Paul Walker re-elected as Secretary, Gary Nowak, Bob Horton, Bill Wick and Keith Lawrence as Board Members.

We had a silent auction with a list of 31 items with several more showing up at the last minute.

Awards

The following received certificates for helping the club in various ways:

Donna Lescoe

Barry Conally

Scott Trunbull

Steve Yerby

Mark Moyer

Brian Johnson

Ron Lewis

Larry Garrett

Peter Gillette

Bob Horton

Dennis Woos

Ron Anstey

Paul Marino

Joel Greene

Jim Bosek

Joe Comeau

Paul Walker

Doug Williamson

Keith Lawrence

Gary Nowak

Telescope Making Award

Gary Nowak

Observing All 110 Messier Objects
(certificate & plaque)

Angele Mott-Nickerson

Mark Moyer

Obs. 400 Herschel Objects
(certificate & plaque)

Keith Lawrence

Obs. 1000 NGC Objects
(certificate & plaque)
Mark Moyer

Obs. >2000 Features on the Moon
(certificate & plaque)
Larry Garrett

Silent Auction a success in 2017

I want to offer a sincere thank you to all who donated goods for the silent auction at the Vermont Astronomical Society's annual meeting this year as well as all who completed the circle by purchasing these treasures. I was pleased to see the excitement as the bidding progressed through the evening and the many happy faces when prizes were received.

The auction helps defray the cost of our meeting and banquet and this year your contributions amounted to \$646. Any profit from the evening will help the VAS with ongoing educational programs.

Many thanks, Keith Lawrence

May

Discussed the format of the monthly meeting. There are multiple goals to meet. Encourage and provide time for members who want to contribute, ensure the main presenter has the time they need and end the meeting on time for those that need to leave by 9:00.

We are considering 3 main options - limit member "mini-talks" to 5 minutes, have members alternate months, "accumulate" some of the mini-talks into a full presentation.

VAS has received an open permit from Burlington to set up on the corner of Church and Cherry streets to set up for public star gazing. Be sure to get a copy of the permit to bring with you if you are planning to do this.

We have received several requests for presentations and star gazing events. Solar Eclipse presentation requests from- Brownell and Hastings libraries. A Solar Eclipse public observing request at Wrightville Reservoir (on Rt. 12 north of Montplier). People's Academy has asked for help in restoring a telescope, Steve Quigley is in contact with them. The Tyler Place has again requested stargazing events for their

guests. South Hero library would like a stargazing event.

We are set for presentations for July, August and September. Currently open for October, November, December. Paul suggested one of those months be used for mini-talks on people's Solar Eclipse experiences.

Gary continues to work on one of the mirrors on Russ Chmela's scope. It has such a shallow curve, the figure changes practically just by looking at it.

We had 37 attendees at the Annual Meeting, a record. All told, we came out ahead financially by about \$250 thanks to the silent auction which brought in \$656.

Membership Committee Report: 17 people attended the Member and Invited Guest event at Angele's on May 21. 13 observing chairs were built. We had 3 people come for help to the Telescope Workshop at Brownell Library and were treated to a slide presentation showing approximately what some objects look like through medium sized scopes.

We had more discussion on what would best serve the club in terms of the new observatory building (such as making it big enough to be able to use multiple scopes in it). We are currently assuming we will move from the current spot but will likely move to a nearby spot, still near the landfill.

June

We are set for monthly presentations through September.

No new info on what may happen with the Hinesburg observing site.

The Site Committee and Observatory Building Committee will meet on 6/28/17 to work on a variety of short and long term options to be as prepared as we can be when we find out what will happen with the site.

Bill is working on his August presentation about collimating Schmidt-Cassegrain telescopes.

We will plan on having a presentation in November from folks who manage to view the August Total Solar Eclipse. The plan also includes a backup presentation in case there is not enough material.

Observers Page

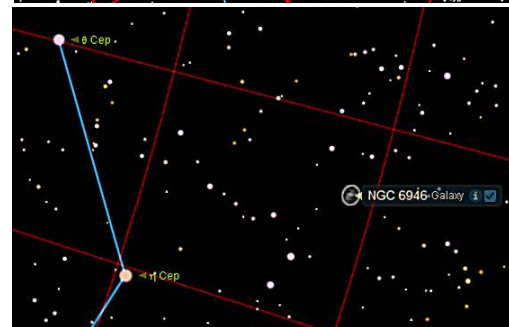
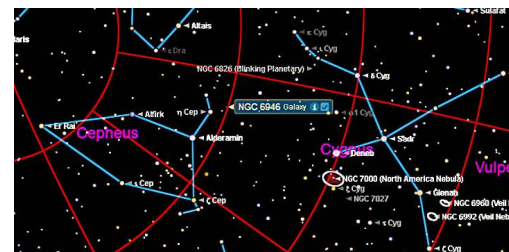
Supernova in NGC 6946 (SN 2017eaw)

This reasonably bright supernova showed up in NGC 6946 on May 14 by Patrick Wiggins. It is located in just south of the border of Cepheus in Cygnus. Several VAS members got a look at it.

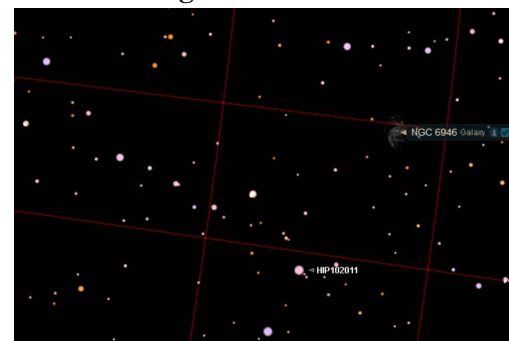
This is what Larry Garrett posted - Sky and telescope posted this yesterday, and at Mv 12.6, this was any easy find in my Orion XT6 6" telescope at 6h20m UT (2:20 AM EDT) last night. I used 114x and the finder charts from Sky and Telescope.

Here's a post from Dennis Woos - A bunch of us observed the supernova last night at the star party, including in the club's 14" dob. Special thanks to Bob Horton for coming prepared to find it!

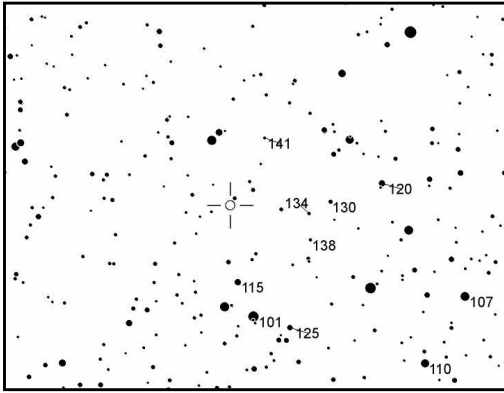
As of mid June it is still holding at about magnitude 13, so it is still readily visible in a 6" scope. Below are finder charts and magnitude comparison charts for those interested.



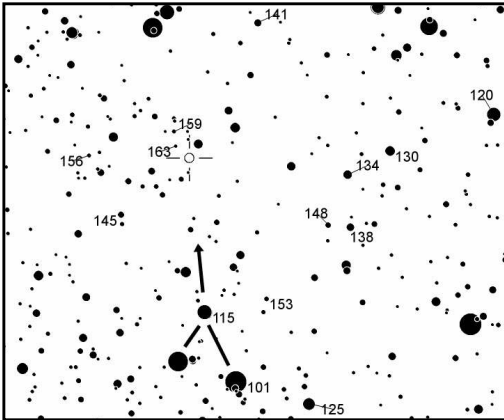
North is left. 2 deg. between grid lines.
Magnitude limit 9.8



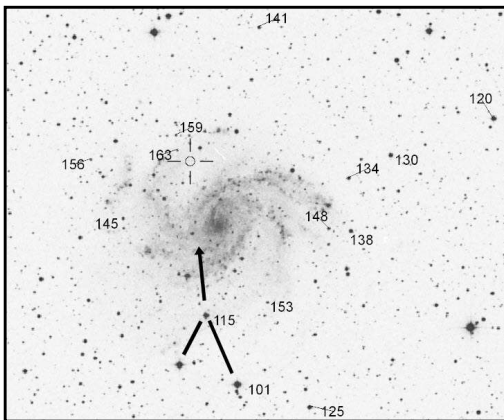
North is left. 1 deg. between grid lines.
Magnitude limit 11.0



North is up. Field of view about 0.6 degrees (~60x in scope)



North is up. Field of view about 0.3 degrees (~120x in scope)



Same field, showing NGC 6946. Only the central part of the galaxy with be visible in most scopes so it will appear that the supernova is outside the galaxy.

The first 2 charts were created from Starry Night Pro planetarium software screen shots. The last 3 are cropped from charts generated on the AAVSO web site. The AAVSO Variable Star Plotter creates standard format charts (top and middle charts above) or charts using Digital Sky Survey images overlain with star magnitudes (bottom chart).

Paul can provide larger versions of the charts to anyone who wants them. To produce your own magnitude charts

go the aavso.org, select Observing tab than Variable Star Charts, Variable Star Plotter (VSP). Use SN 2017eaw for the name/designation/AUID. There are several options for field of view, orientation, etc.

NGC 6946 is located fairly close to our galaxy at 22 million light-years. It is fairly small with a diameter of 40,000 light-years, less than half that of the Milkyway. It is fairly bright at 9.7 magnitude. If not for the fact we are viewing it behind dust near the plane of our galaxy it would be brighter still.

This is a very active galaxy when it comes to making stars which also has made it very prolific when it comes to producing supernovae. With 10 supernovae starting with 1917A is has had the more than any other known galaxy.

NGC 896 / IC 1795 (part of the Heart Nebula)

2017-01-16

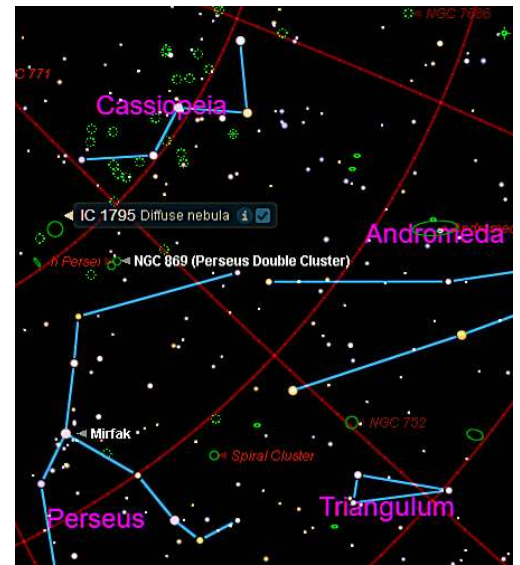
Constellation - Cassiopeia

This is the “bottom” tip of the Heart Nebula which the brightest part of the nebula. I we checking out open star clusters in the vicinity of the Double Cluster (NGC 869 & 884 in Perseus) with Starry Night Pro looking for an object to image. I didn’t know the nebula was there. It wasn’t until I had zoomed way in that the NCG and IC labels started showing up. A real nice

feature of Starry Night Pro is the All Sky Image overlay, especially for the astro-imager. I adjusted the brightness way up and could see plenty of red emission nebula in the area. Without the image overlay I wouldn’t have had clue that there was anything there worth imaging.

Next time I have the 4.25” f/4 scope on the mount and the Heart Nebula is well positioned I’ll try for the whole thing (the 10” f/4 didn’t fit but a little piece of it in the view).

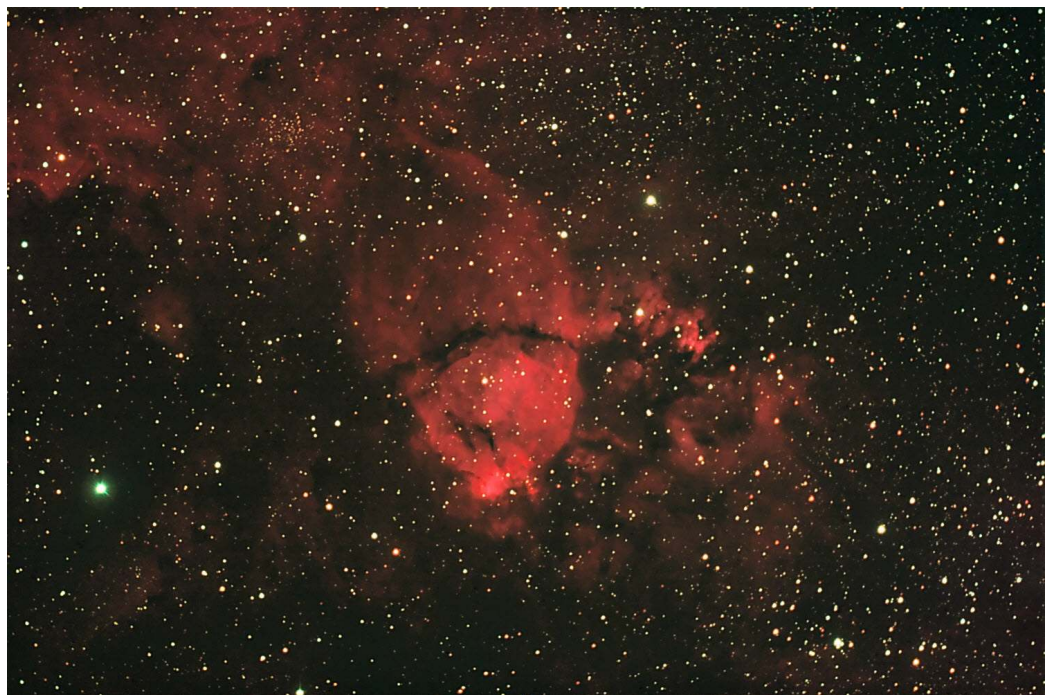
You can see this piece is made up of a complex mix of bright hydrogen emission nebula and dusty dark nebula.



Finder Chart

Technical Details:

(Meade LXD55) 10 inch f/4.0
(1000mm fl) Schmidt-Newtonian
Field of view: 0.79 X 1.21 deg.



Exposure 4 min. X 26 (1 hr 44 min)
ISO 1600
Camera Orientation - Portrait w/ north
Right
SkyWatcher EQ-6 German Equatorial
Camera - Modified Canon Rebel XT (8
mega pixel) (modified by Hap Griffin)
Orion Broadband Light Pollution Filter
Baader Coma Corrector (MPCC)
Autoguider- Celestron NexGuide
Guide Scope - 90mm f/13.3 1200mm fl
Maksutov-Cassegrain
Camera Temperature - 31.7 degree F
Transparency (sky brightness) at target
20.78 to 20.82 mag/arc sec (Sky Quality
Meter)
Transparency (sky brightness) at Polaris
20.91 to 20.96 mag/arc sec
Seeing 5 (scale of 1-10)
Limiting Visual Magnitude 5.6 (near
Polaris)
Stacking - Registax 5
Noise Reduction - Noise Ninja 2
Other - Picture Window Pro 6 & Ado-
be Photoshop Elements 9

Gary's Astronomical Events for the Month

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

Angele on the Radio

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

For Sale

Meade 6" LXD55 telescope with
the following: 26mm eye piece, Spot-
ting Scope, Anniversary eye piece kit
with 15mm; 6.4mm; 9.7mm; 12.4mm;
40mm; 32mm; and 20mm. Solar filter,
Dew cap, Autostar Instruction Manu-
al, Martin Preston users guide

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

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

Celestron Omni XLT 120mm Re- fractor Telescope with Equatorial Mount.

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

Original price \$550 for telescope;
\$150 for accessories
Yours for **\$200 OBO**,

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

Celestron 23mm Axiom

Basically unused and very clean condi-
tion. 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

Celestron SP-C80 refractor tele- scope 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

Celestron Astromaster 70 EQ (Ger-
man Equatorial Mount) Never used.
Purchased for project, then changed
my mind. Uses standard 1.25-in eye-
pieces. Very well built. New it goes for
\$170. **Asking \$70.**

Al Boudreau 802-758-2221 or
astromanvt@gmavt.net

Feather-touch focuser for a

Schmidt-Cassigrain. Brand new,
hardly used. For specs go to
<http://starlightinstruments.com/stor>
e/index.php?route=product/product
&product_id=51. **Asking \$200** for it.

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

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 Apo-
chromatic Triplet Refractor Telescope
(FCD100 ED). Paid - \$1000.

Asking \$600 for the pair.

Stephen Scaravella, 802-434-3884 or
englishnotation@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

Meade DS-2114S (early 2000's vin- tage)

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

Automated, computerized with Meade
Autostar handbox

Automatic tracking, guided tours,
many other features

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 automat-
ed 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, 802-249-
3595 or 802-223-2204

Homemade 10" F/4.975 Newtonian on Dobsonian mount. Both mirrors have enhanced 96% reflective coatings. Newtonian has JMI 2" Reverse Crayford focuser. Telescope has Pyrex primary mirror. This scope is good for low power deep sky objects. **\$500.00**

Sears (ca. 1968) 3" F/15 Refractor OTA only. Does have focuser upgrade to accept 1.25" eyepieces. Doublet Lens is actually an F/16. Includes finder. **\$100.00**

Oberwerk Lightweight 15 X 70 Binoculars, F.O.V. 4.3 degrees, Eye Relief 16 mm, Great for sweeping the Milky Way. **\$70.00**

Oberwerk Lightweight 9 X 60 Binoculars, F.O.V. 5.0 degrees, Eye Relief 14 mm, Can be hand held. **\$50.00**

For more information please contact; Gary Nowak, Tel 802-879-4032, gtnowak@surfglobal.net

Wanted

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

Special Note

We are Considering Looking for a New Site for the VAS Observatory

Does anyone have potential leads for a new observing site for the VAS?

As some you know, Hinesburg is looking to re-purpose the spot where our observatory is (again) as part of an expansion plan for the Town Garage. At this time it is not known when or if this will happen.

Hinesburg likes us and has suggested we could relocate onto the landfill cap. There is a spot just south of the cap that may work.

The VAS Board and the Site Committee are thinking this is a good time to consider other options for a longer term observing site. We do not have the funds, without a significant fund raising campaign, to purchase land.

In considering or sites, do you know of particular sites in which the owner may be willing to provide a long term (25+ year lease). Do you know of specific state parks that have an area with good view of the sky we could contact (area should be somewhat removed from campers and be available off season). Even better would be someone willing to donate a parcel of land to us.

Some constraints/desired features:

- Reasonably dark sky and be within a 30-45 min drive of the Burlington area.
- Minimal site preparation (doesn't require building an access road, extensive tree clearing, etc.).
- Room for 2-3 buildings (long term plans) plus enough area for several members to set up scopes.
- Room to park a minimum of 10-15 cars.
- Low light pollution (both local and distant).
- 5 degree or less southern horizon with little light pollution in that direction (very desirable).
- Good West and East views.
- North view 10 degrees or better below Polaris.
- Due to fog, not too close to a large body of water.

Announcements

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 - 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: info@vtastro.org

Paul Marino is the webmaster:

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

Editor and Publisher - Paul Walker

Contributors: Joe Comeau, Larry Garrett, Marcus Woo (NASA's Space Place), Mike Stadtmauer, Jack St. Louis. Paul Walker
(My apologies if I missed anyone)

Dues

Associate Members \$15
Full Members \$25

Contact Paul Walker

802-388-4220

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