



Morning Star

Winter 2016



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M-42 the Great Nebula in Orion
By Al Boudreau

4-sec exposure with a Mallincom, minimal processing. Telescope - 6 inch SCT.

New Members

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

- John Picanza (should have been listed in the last newsletter)
- Melinda Cobb
- Peter Searle
- Sam Adams
- Cherie Cyr
- Jeff Loiter
- Robert Williams (re-joined)
- Sam Hooker
- Amed Shareef
- Alfred Cyr
- Cale Shipman
- Raymond Harvey

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). 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.

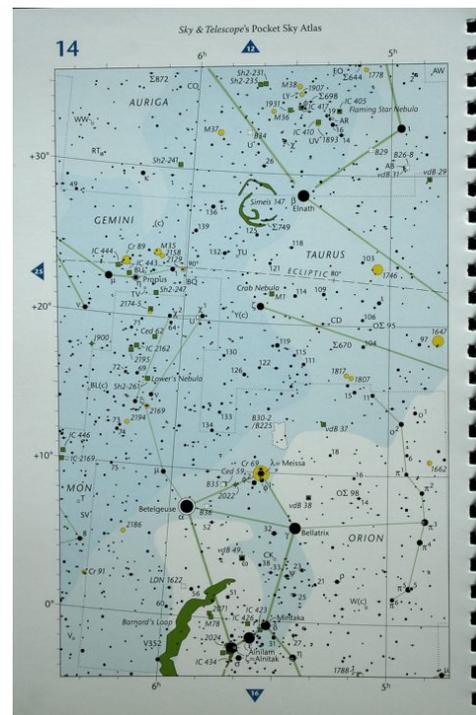
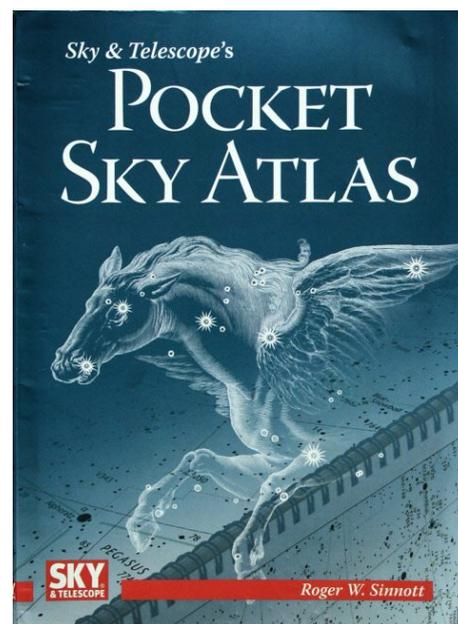
January 4

Star Atlases

By Mark Moyer, Gary Nowak, Angele Mott-Nickerson and Paul Walker

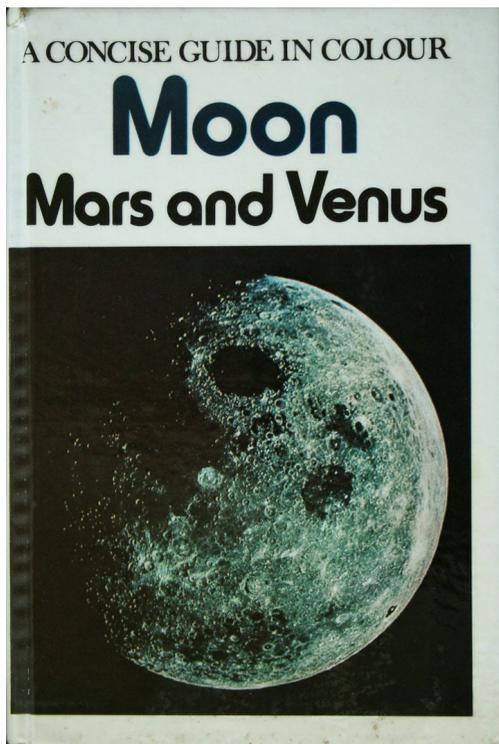
Here's a chance for people to see and learn about the different types of star atlases and charts that people use (Great Atlas of the Sky, Interstelluum Deep Sky Atlas, Pocket Sky Atlas, Uranometria, ..., as well as free downloadable charts like the TriAtlas). Most people probably use one or two but have little idea of the other options available and what their advantages and disadvantages are.

Four members will bring in some of their star atlases. Each person will talk for a few minutes describing it (cost, scale, dimmest stars charted, how many deep sky objects it shows, etc.). At the end people can come up front to look at them and compare. A brief overview will also be given of the various star chart/planetarium programs (e.g., Stellarium, Cartes du Ciel, etc.).

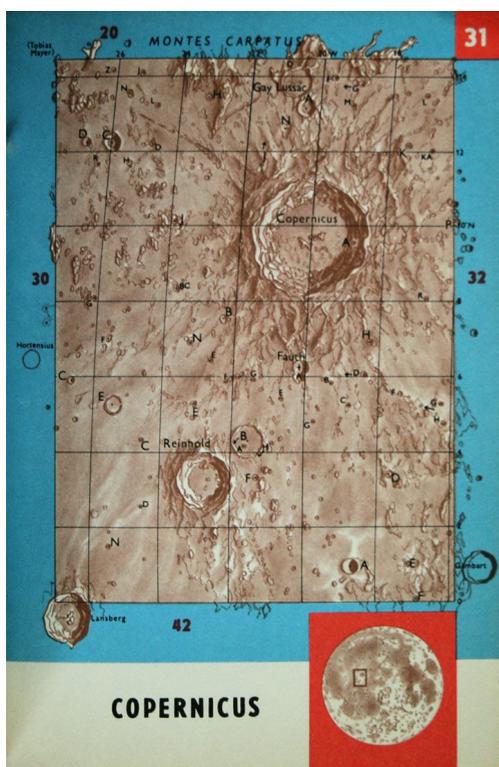


February 1

A Lunar Library –
Myths, Atlases, and Guides
By Catherine James



Cathy James will bring her extensive library of books on the Moon and discuss the strengths and weaknesses of each one. Everything from "The Moon and the Western Imagination" to the Clementine Lunar Digital Image Mosaics will be touched on. Please join Cathy as she shares her love of the Moon and all that has been written about it!



March 7

Observing Forms & Records
By Kieth Lawrence,
Gary Nowak, Mark Moyer
and Paul Walker

DEEP SKY OBSERVING FORM

OBSERVER Paul Walker

OBSERVING LOCATION Panton, Vt.

DATE 5/10/24 TIME START (GMT) 17:05 TIME END (GMT) 17:28

SEEING (1 to 10) 6 TRANSPARENCY (1 to 6) 4

OBJECT OBSERVED Orion Neb (M-97)

BINOCULARS X

TELESCOPE APERTURE 10 5.6

EYEPIECE TYPE _____ FOCAL LENGTH _____ MM

SKETCH GENERAL LOCATION IN CONSTELLATION

SKETCH VIEW IN FINDER TELESCOPE

OBJECT DRAWING

NOTES The 'eyes' are barely visible with modest magn.

The previous 2 month's presentations covered atlases for finding your way to stars, star clusters, nebulae and galaxies, as well as craters and other features on the Moon. This presentation will focus on recording those observations using various observing forms.

Observing forms typically include date, time, name of the object and equipment used. Additionally there is space for doing a sketch of what you can see. Because it is useful in providing information of how sky conditions affect your observation, transparency and seeing (or steadiness of the air) is often included.

Photo Sheet for Digital Camera			
Subject	M-33	Transparency* (Target)	20.77
Date	10/29/13	Transparency* (Zenith)	20.78
Telescope/Lens	10"	Temperature Scope (°F)	23.5
Fratio	4	Temperature Cam (°F)	20.5
Camera	XT	Seeing (1-10)	4
ISO	400	Time - Time Zone (EDT)	20:37 9:58 10:40
Exp Time	3 min	Notes:	7:45 10:38
Camera Rotation	P 11 ↑		
Telescope Rotation	11 ↑		
Coma Corrector	Bower MPCC		
Filter	Orion BB LP		
* Magnitude / Sq Arc Sec, measured with Sky Quality Meter (SQM)			
Subject	M-33	Transparency* (Target)	20.87
Date	10/30/13	Transparency* (Zenith)	20.78
Telescope/Lens	10"	Temperature Scope (°F)	32
Fratio	4	Temperature Cam (°F)	33.5
Camera	XT Mod	Seeing (1-10)	7
ISO	400	Time - Time Zone (EDT)	20:30 9:55 10:04
Exp Time	3 min	Notes:	8:57 10:07
Camera Rotation	P 11/16/14 64		
Telescope Rotation	11K		
Coma Corrector	Bower MPCC		
Filter	Orion BB LP		
* Magnitude / Sq Arc Sec, measured with Sky Quality Meter (SQM)			

Events

VAS Observing Schedule

All events - 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 (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.

Member and Invited Guest Star Parties at the GMO

(Green Mountain Observatory)
100 Observatory Road, Hinesburg, VT
Done for the season

Star Gazing at Angele's

Angele may host some star gazing parties this winter (she and her husband have a warm barn next to her observing area. Keep on eye on your email for announcements.

Any observing will start about 7:00 PM.

For Star Gazing at the GMO

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

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 the web site for last minute updates and cancellations.

Articles

VAS Public Star Gazing

School, Library and other group requested star gazing parties. - None currently scheduled.

If you know of a group or institution that would like to schedule a star gazing session.

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

**Public Star Gazing at
 UVM Horticulture Research
 Center, 65 Green Mountain Drive,
 So Burlington VT**
Stay Tuned for next
 Spring's schedule

**Public Star Gazing at
 Libraries**
Stay Tuned

**Green Mountain Alliance of Amateur Astronomers
 (GMAAA)**

Stay tuned for next year's schedule.

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

**Most events 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"



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 websites be added to your club's web page."

**How we know Mars has liquid water
 on its surface
 by Ethan Siegel**

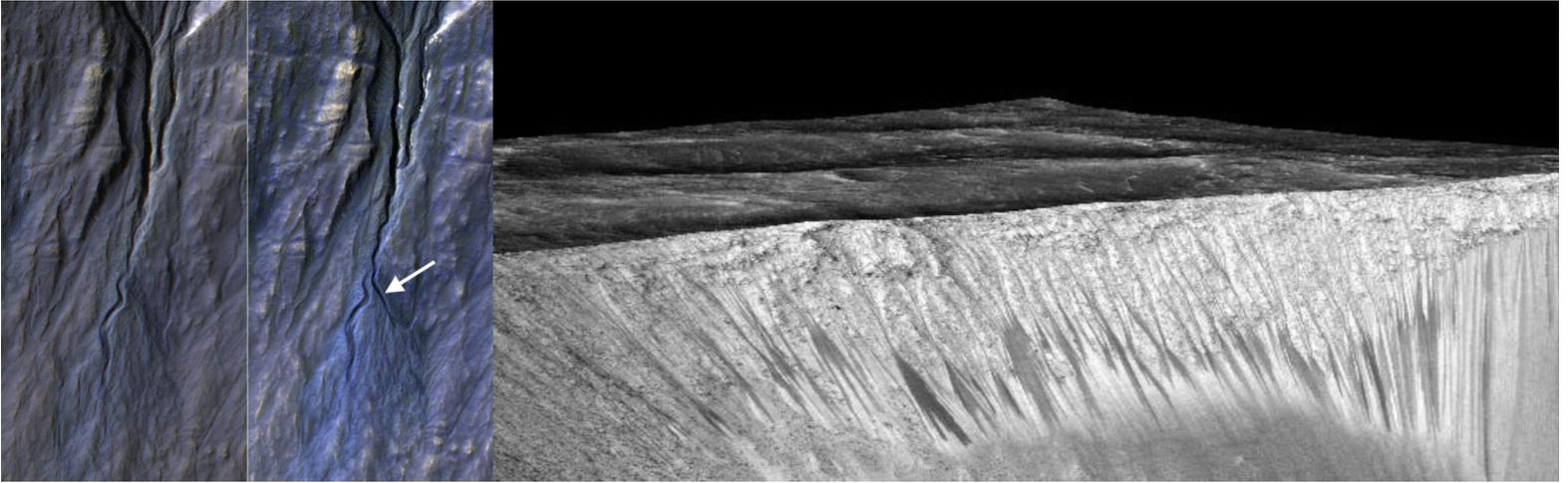
Of all the planets in the solar system other than our own, Mars is the one place with the most Earth-like past. Geological features on the surface such as

dried up riverbeds, sedimentary patterns, mineral spherules nicknamed "blueberries," and evidence of liquid-based erosion all tell the same story: that of a wet, watery past. But although we've found plenty of evidence for molecular water on Mars in the solid (ice) and gaseous (vapor) states, including in icecaps, clouds and subsurface ices exposed (and sublimated) by digging, that in no way meant there'd be water in its liquid phase today.

Sure, water flowed on the surface of Mars during the first billion years of the solar system, perhaps producing an ocean a mile deep, though the ocean presence is still much debated. Given that life on Earth took hold well within that time, it's conceivable that Mars was once a rich, living planet as well. But unlike Earth, Mars is small: small enough that its interior cooled and lost its protective magnetic field, enabling the sun's solar wind to strip its atmosphere away. Without a significant atmosphere, the liquid phase of water became a virtual impossibility, and Mars became the arid world we know it to be today.

But certain ions—potassium, calcium, sodium, magnesium, chloride and fluoride, among others—get left behind when the liquid water disappears, leaving a "salt" residue of mineral salts (that may include table salt, sodium chloride) on the surface. While pure liquid water may not persist at standard Martian pressures and temperatures, extremely salty, briny water can indeed stay in a liquid state for extended periods under the conditions on the Red Planet. It's more of a "sandy crust" like you'd experience on the shore when the tide goes out than the flowing waters we're used to in rivers on Earth, but it means that under the right temperature conditions, liquid water does exist on Mars today, at least in small amounts.

The measured presence and concentration of these salts, found in the dark streaks that come and go on steep crater walls, combined with our knowledge of how water behaves under certain physical and chemical conditions and the observations of changing features on the Martian surface supports the idea that this is the action of liquid water. Short of taking a sample and analyzing it in situ on Mars, this is the best current evi-



Images credit: NASA/JPL-Caltech/Univ. of Arizona, of a newly-formed gully on the Martian surface (L) and of the series of gullies where the salt deposits were found (R).

dence we have for liquid water on our red neighbor. Next up? Finding out if there are any single-celled organisms hardy enough to survive and thrive under those conditions, possibly even native to Mars itself!

How will we finally image the event horizon of a black hole?

By Ethan Siegel

One hundred years ago, Albert Einstein first put forth his theory of General Relativity, which laid out the relationship between spacetime and the matter and energy present within it. While it successfully recovered Newtonian gravity and predicted the additional precession of Mercury's orbit, the only exact solution that Einstein himself discovered was the trivial one: that for completely empty space. Less than two months after releasing his theory, however, the German scientist Karl Schwarzschild provided a true exact solution, that of a massive, infinitely dense object, a black hole.

One of the curious things that popped out of Schwarzschild's solution was the existence of an event horizon, or a region of space that was so severely curved that nothing, not even light, could escape from it. The size of this event horizon would be directly proportional to the mass of the black hole. A black hole the mass of Earth would have an event horizon less than a centimeter in radius; a black hole the mass of the sun would have an event horizon just a few kilometers in radius; and a supermas-

sive black hole would have an event horizon the size of a planetary orbit.

Our galaxy has since been discovered to house a black hole about four million solar masses in size, with an event horizon about 23.6 million kilometers across, or about 40 percent the size of Mercury's orbit around the sun. At a

distance of 26,000 light years, it's the largest event horizon in angular size visible from Earth, but at just 19 micro-arcseconds, it would take a telescope the size of Earth to resolve it – a practical impossibility.

But all hope isn't lost! If instead of a single telescope, we built an array of tele-

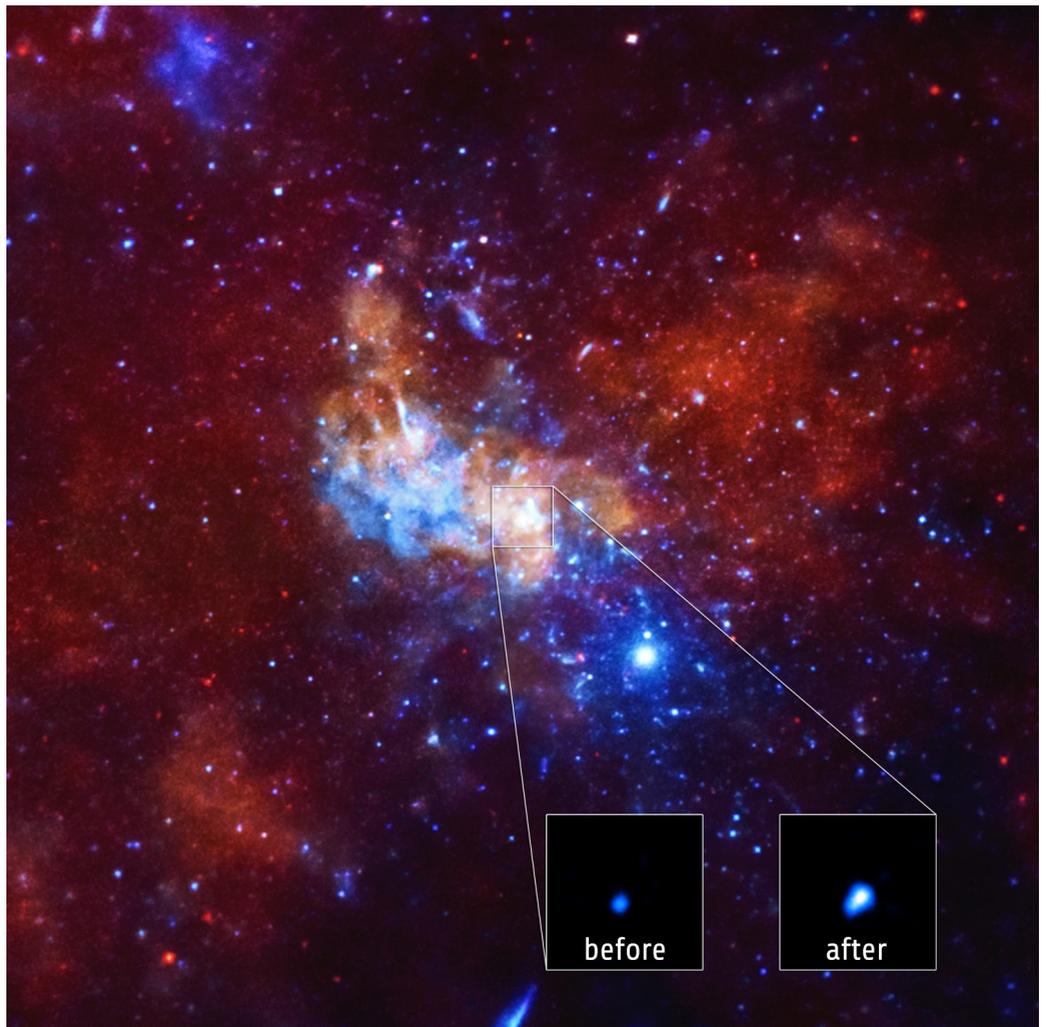


Image credit: NASA/CXC/Amherst College/D.Haggard et al., of the galactic center in X-rays. Sagittarius A* is the supermassive black hole at our Milky Way's center, which normally emits X-ray light of a particular brightness. However, 2013 saw a flare increase its luminosity by a factor of many hundreds, as the black hole devoured matter. The event horizon has yet to be revealed.

scopes located all over Earth, we could simultaneously image the galactic center, and use the technique of VLBI (very long-baseline interferometry) to resolve the black hole's event horizon. The array would only have the light-gathering power of the individual telescopes, meaning the black hole (in the radio) will appear very faint, but they can obtain the resolution of a telescope that's the distance between the farthest telescopes in the array! The planned Event Horizon Telescope, spanning four different continents (including Antarctica), should be able to resolve under 10 micro-arc-seconds, imaging a black hole directly for the first time and answering the question of whether or not they truly contain an event horizon. What began as a mere mathematical solution is now just a few years away from being observed and known for certain!

Note: This month's article describes a project that is not related to NASA and does not suggest any relationship or endorsement. Its coverage is for general interest and educational purposes.

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:

October 20

Jack said that Ethan Allen Homestead had a Lights Out event and asked if we could help, Jacked said yes and helped at the event. Their new director is interested in renewing public star gazing at the park.

Joe reported that the the Lunar Eclipse was good from the Burlington Waterfront with good turnout. St. Michael's also had good attendance.

Angele has updated our Facebook page.

Keith suggested that we may want to reconsider how we do some of our public outreach. He and Jack did a short series of adult astronomy classes at CVUHS at their request. It was attended by a group of enthusiastic people.

Keith reported that the Library Loaner Scope Program is working on the scope for the Carpenter-Carr Library in Hinesburg. He and Dennis will present the program to the Lawrence Memorial Library in Bristol.

Bob is continuing to work on re-figuring the 14.5 inch mirror from the Patterson scope (donated to the club earlier this year along with a old but nice Byers equatorial mount). The current plan is to use this mount in the Russell Chmela Memorial observatory (which is in the planning stage, expect to start site prep in the Spring).

November 17

Paul reported we are set for monthly meeting presentation through March 2016 (we are now set through April and probably through July).

Angele's first star gazing party was well attended. However, some members, relatively new to the hobby, found it was not as helpful for them as they had hoped. Keith suggested the Activity Committee may want to address this by organizing some workshops on telescopes (using them, collimating optics) and finding things in the sky.

Keith reported that along with the scope for Carpenter-Carr, one for the Lawrence Memorial Library in Bristol is almost ready.

The site committee reported to the Board, the discussions they had about the Russell Chmela Memorial observatory.

Gary got a call about a UFO. Turned out to be a airplane contrail (possibly from a military AC-130).

The board voted to renew our IDA (International Dark-Sky Association) membership.

Doug reminded us it it time to update the club's asset list (mostly involves updating the appreciated value of items).

Jack has been in communication with the Hinesburg town offices involving a proposed housing project in the works on land adjacent to the town property that our observatory is on.

December - No meeting

Other Club News

The silent auction we had at last year's Annual Meeting/Banquet was so

much fun we are planning to have another at this year's banquet.

I think the plan is to take donations of equipment that members no longer want or need as well as some VAS equipment. It will be a way for the club to raise a little money, members to cull unused items and for a good price, gain a few items they don't have.



Angele on the Radio

VAS member Angele Mott Nicker provided an astronomy update at radio station WJOY AM (AM 1230) on Ginny McGehee's 'Breakfast Table' morning show. This update was on Wednesday 4 November (first Wednesday of the month at 8:40 AM), Angele was back on 2 December and will return in January 2016 on the 6th. Great job Angele.

Observers Page

Citizen Science Opportunities Throughout the Zooniverse

Info provided by Sam Hooker

"The Zooniverse is the world's largest and most popular platform for people-powered research. This research is made possible by volunteers—hundreds of thousands of people around the world who come together to assist professional researchers. Our goal is to enable research that would not be possible, or practical, otherwise. Zooniverse research results in new discoveries, datasets useful to the wider research community, and many publications." (from www.zooniverse.org/about/)

Zooniverse currently hosts 38 projects spanning the natural- and social sciences (at least nine of which are likely to directly interest astronomers) with more being evaluated by volunteers. The best

ones enable amateurs with clever tools, presented right in your web browser. Too cold/cloudy to make your own observations? Advance science by helping the pros analyze theirs!

Get started with "Asteroid Zoo", "Disk Detective", "Planet Four" and others at www.zooniverse.org/projects/.

Venus Occultation (Dec. 7, 2015)

Any one observe occultation of Venus by the Moon? I had planned to take a video with my 90mm ETX, and even got a test run in. But clouds ruined the show, leaving the pair in and out near the event time. I did observe the occultation in 7x35mm binos from the parking lot of Queen City Printers at about 12:38:38 PM. I observed another Venus occultation event there as well in 2001.

–Lawrence Garrett

Doug Williamson and I observed ingress with handheld binos. I counted 13 seconds from when I could first detect a dimming until extinction. We were unsuccessful on detecting egress, as there was quite a bit of cloud/haze.

I find the reported durations (60 - 90 minutes) interesting. Given that the Moon travels towards the east approximately its own diameter every hour (i.e. 360 degrees in 30 days, 30 arcminutes /

hour), then one would think that the longest occultation would be one hour. However, the Earth is rotating towards the east 15 degrees / hour (i.e. 360 degrees in 24 hours), so that changes the parallax considerably! I assume that the motion of Venus in 1 hour is negligible.

–Dennis Woos

I was all set up, forgoing lunch for it. Got views of the Moon and Venus, but they were hazy and in-and-out of clouds as the time approached. Socked in a few minutes beforehand, never opened back up.

–Peter Gillette

"Halloween" Asteroid

I spotted the "Halloween" asteroid here in Fairfax the night of 11/30/15.

Despite its bright predicted magnitude of 11.9 at time of observation, this both near-Earth and (in our skies) near-Moon object, 2015 TB145, was hard to find in a 12.5" reflector. I used my home as a Moon shade to at least keep my eye's and scope out of the bright light just 15 degrees from the target.

Starting at about 3h05m UT, nothing was seen at 116x, then I increased to 187x without success around 3h15m. In a dark sky, these would normally show the asteroid with ease. At this time the

asteroid was moving at 1.064 degrees per hour

Only after going to 270x in a zoom, did enough field stars finally become visible around 3h25m. Even after this, finding the fast moving target took until 3h28m. I followed the asteroid for just 3 minutes before the moon was no longer shaded by the house. My 95th NEA.

Always a great show.

–Lawrence Garrett

Lunar Occultation of Aldebaran

The Morning of 2015-11-26

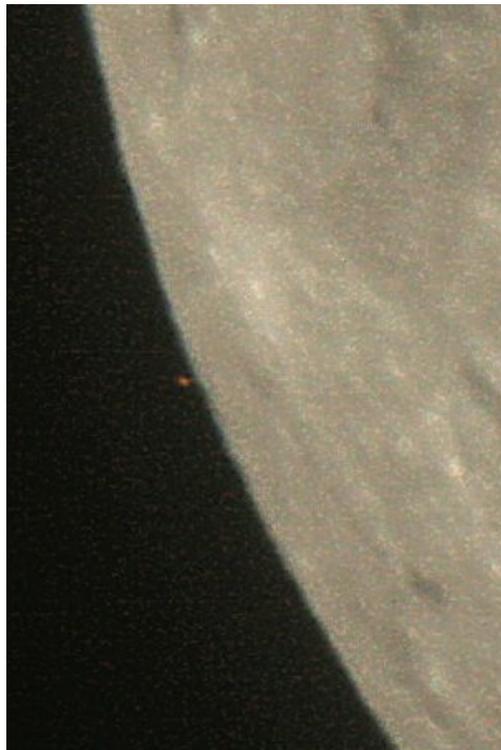
from Middlebury, VT

By Paul Walker

Not quite as exciting as the Venus Occultation (which I missed) but nice none the less.

I thought I was going to have to just set up a camera with a telephoto lens out in field near my house. However, when I checked the azimuth and elevation from my backyard I found it would be low but high enough to image through my "big" 10 inch scope.

I had 2 cameras set up, one with a zoom lens set to 200mm on an iOptron Sky Tracker and another on my 10" f/5.6 Newtonian. Both cameras were set up for time lapse photography taking taking 1 image per second. Aldebaran was not bright enough for the



Aldebaran Occultation Sequence from 2015-11-26 through a 10 inch f/5.6 Telescope, taken approx. 5:40:45, 5:41:20, 5:41:26 AM

The Pleiades

By Paul Walker

200mm telephoto but was for the 10" scope (see images at bottom of previous page).

At the time of the occultation the conditions were far from ideal with thin clouds moving through and the Moon down in the trees to boot, a little lower than I thought it would be. At least there are no leaves on the trees this time of year.

I did some test shots to see what would work for capturing both the Moon and Aldebaran (which is magnitude 0.8). That was with fewer clouds and no tree branches in the way. When I realized I should have increased the exposure time it was too late. The following is what I ended up using on the 10" scope: 1/160 sec. exposure at ISO 200. Additional technical details:

10 inch f/5.6 (1407mm fl) Newtonian
Field of view: 0.90 x 0.60 deg.
Camera Canon Rebel XTi (10 M pixel)
Baader Coma Corrector (MPCC)

The original images show the full disk of the Moon. The images at the bottom of the previous page are cropped to better show Aldebaran. I also made a time-lapse video from the images.

Taking advantage of the field of view of my new 6" f/4 Newtonian telescope, I took images of the Pleiades star cluster (M-45) also known as the Seven Sisters from Greek mythology.

It used to be thought that the nebulosity surrounding the stars was left over material from the formation of the cluster. It has been determined it is actually an interstellar dust cloud they just happen to be passing through. The cluster is estimated to be about 100 million years old and that it will disperse over the next 250 million years. The Pleiades is relatively close at 445 light-years.

When processing the images I was surprised how little blue showed in the images. I am used to seeing the nebulosity depicted as a striking blue color. I used a standard Canon XTi camera set to daylight color balance and without a light pollution filter. This gives me very close to a neutral gray sky (especially now that Middlebury has mostly LED streetlights). I did increase the color saturation to enhance the blue near the stars.

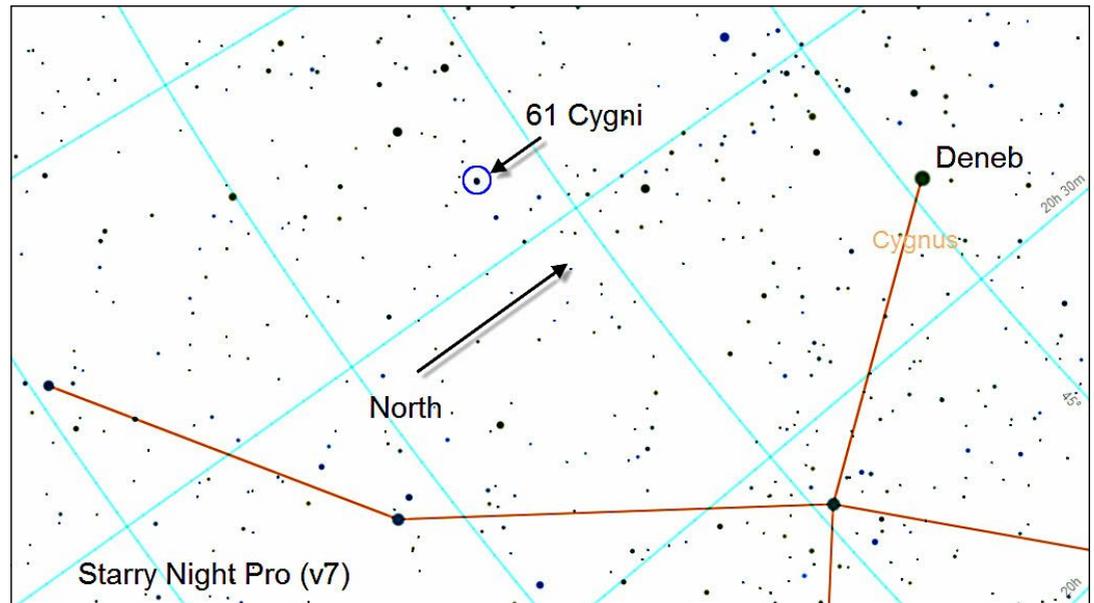
Technical Details:

6 inch f/4.0, 610mm fl, TPO (3rd Planet Optics) imaging Newtonian.
4min X 43 (2hr 53 min), ISO 800, Field of view: 1.32 x 2.02 deg.
Camera - Canon Rebel Xti
Camera Orientation - Landscape w/ north down
SkyWatcher EQ-6 German Equatorial Mount with Orion Atlas Goto Electronic & Motor Upgrade Kit
No Light Pollution Filter
Baader Coma Corrector (MPCC)
Autoguider- Celestron NexGuide
Guide Scope - 90mm f/13.3 1200mm fl Maksutov-Cassegrain
Camera Temperature- 25.5 to 30.5 degree F
Target Transparency (sky brightness) 20.95 to 21.0 mag/arc sec (Sky Quality Meter)
Zenith Transparency (sky brightness) 20.95 to 21.0 mag/arc sec (Sky Quality Meter)
Seeing 4 (1-10)
Limiting Visual Magnitude 5.9 (near Polaris)
Stacking - Registax 5
Noise Reduction - Noise Ninja 2
Other - Picture Window Pro 6 & Adobe Photoshop Elements 9



61 Cyni

By Paul Walker



Last October I started a long term project. I read in Sky & Telescope magazine that the double star 61 Cygni was passing close to a 10th magnitude star. They suggested it was a great opportunity to see proper motion by viewing and making drawings of it over the next few years. I thought that would be cool but, being more into pictures, decided to do a series of images. I plan to take images every year for several years and make them into a time lapse movie.

The image at the top left of was taken on 2014-10-21, the one in the middle

2015-10-18 (processing of the two images is a little different). The bottom is a composite of the two. The field of view (these are cropped images) is 3.7 minutes by 2.5 minutes of arc. That is the equivalent of 800X in an eyepiece with a 50 degree apparent field of view.

61 Cygni consists of 5.2 and 6.0 magnitude stars putting them in range of the unaided eye and making them easy to find. The 10th magnitude star is bright enough to see in small telescopes. The binary system has a 659 year orbit and is very close to us at 11.4 lights



years. They have the 7th largest known proper motion of any stars and the highest proper motion of any stars visible with the unaided eye.

For the fun of it I made some measurements from the images. On last year's image I measured a distance of 12.56 +/- 0.3 arc sec from 61A Cygni to the mag 10 star and a distance of 31.6 +/- 0.3 arc sec from 61A to 61B.

Measurements from this year's image gave me a distances of 18.91 +/- 0.3 and 31.31 +/- 0.3 arc sec respectively. I also measured a single 1 sec image and got 31.62 +/- 0.3 arc sec between A and B.

Based on these measurements 61 Cygni moved 18.91-12.56 = 6.35 arc sec in the year between the shots, right in line with the official value of 6.33.

Technical Details:

5 sec x 15 images at ISO 1600
 Camera- Canon Rebel XTi
 North - up
 10 inch f/5.6 (1407mm fl) Newtonian with a normal field of view of 0.90 x 0.60 deg., but using a 2 inch, 2X Barlow that gives magnification factor of 2.65X (the focal plane of the camera is farther

out then the focal plane of an eyepiece making the projection distance greater). This makes the system equivalent to 3730 mm fl at f/14.8 with a field of view of 0.21 x 0.33 deg and a resolution of 0.31 arcsec/pixel (the Rayleigh limit of the 10" scope).

Andromeda Galaxy

By Paul Walker

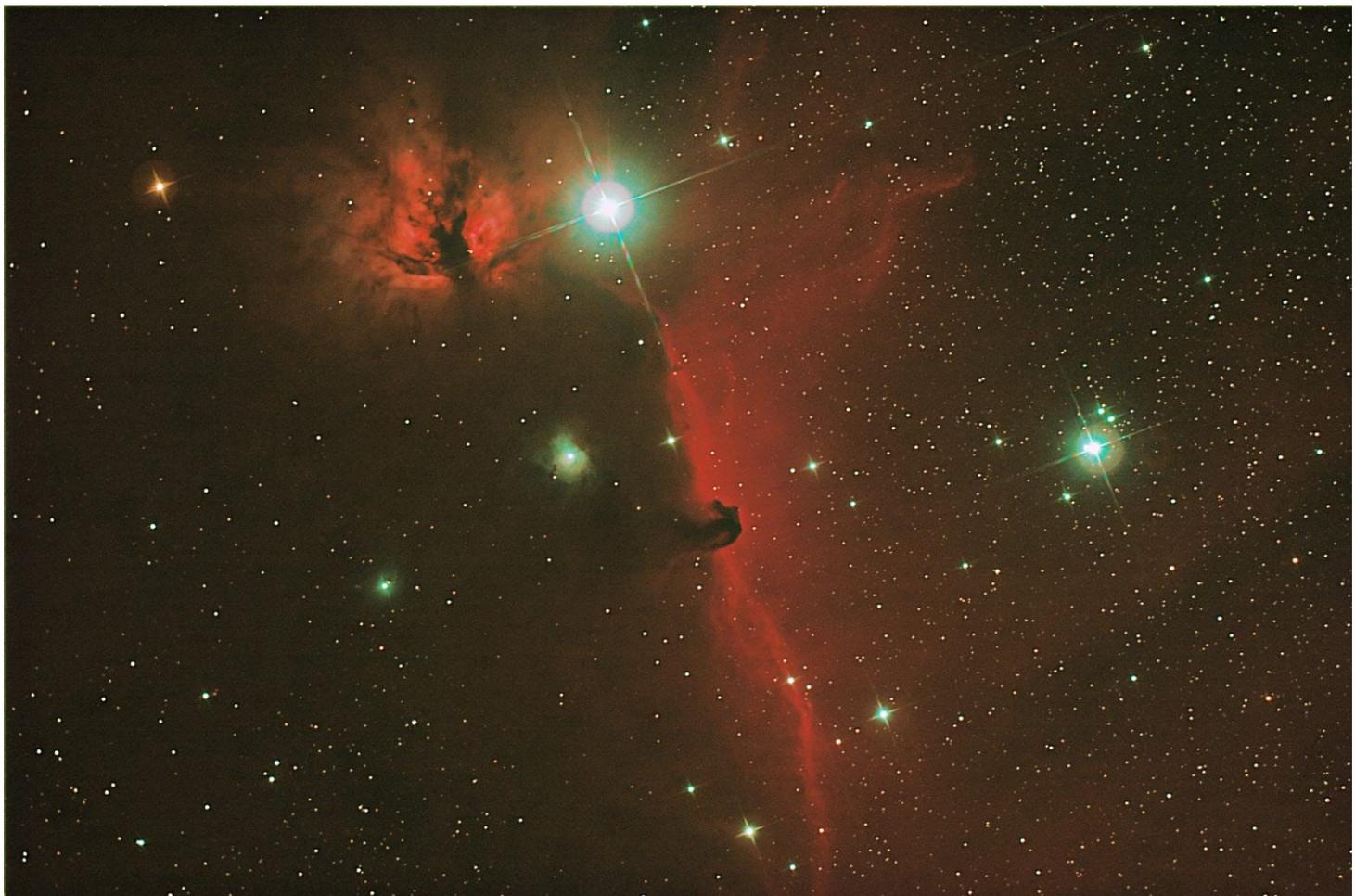
On the bottom of the previous page is another image taken with my new 6 inch f/4 scope. I wasn't sure how well it would frame this galaxy. I knew it wouldn't cover the full extend of the disk, I need to us my 4.25" f/4 scope for that. I knew the 8" f/4 wouldn't cover even the brightest parts of Andromeda. As you can see a 6" f/4 is just about right. Covers the brightest portion (if I rotate the camera a little from north-south) and includes its companion dwarf galaxies, M32 and M110.

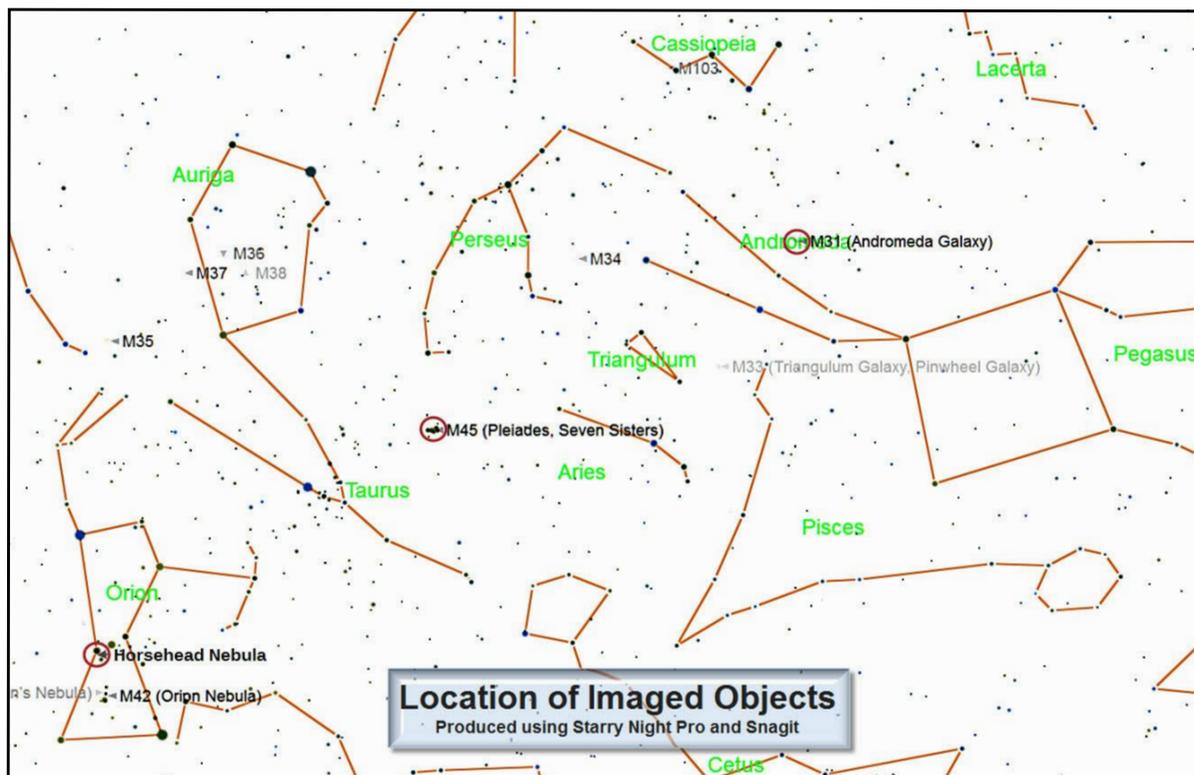
To reduce the horizontal banding that is inherent in CCD imagers, especially DSLR (digital single lens reflex) cameras I dithered the images. That is

after every 5th shot I stopped the autoguider and moved the telescope North or South about 10 arc seconds using the hand controller on the autoguider. This is about 10 pixels (counts) on the guiders display.

Technical Details:

Taken 2015-12-05, 6:36 to 10:55 PM
 Middlebury, VT
 Exp 4 min X 49 (3hr 16min) I was shooting for 4 hours or more but lost some frames to clouds or frost.
 ISO 800
 Limiting magnitude on image ~18.0, on the original ~18.5
 Camera - Modified Canon Rebel XT.
 Orientation - Landscape w/ north upper left (camera rotated approx. 25 degrees CW, image approx. 25 degrees CCW).
 6 inch f/4.0, 610mm fl, TPO (3rd Planet Optics) imaging Newtonian.
 Field of view: 1.32 x 2.02 deg.
 SkyWatcher EQ-6 German Equatorial Mount with Orion Atlas Goto Electronics & Motor Upgrade Kit
 Orion Broadband Light Pollution Filter
 Baader Coma Corrector
 Autoguider- Celestron NexGuide





Guide Scope - 90mm f/13.3 1200mm fl
Maksutov-Cassegrain

Camera Temperature- 22 to 32 degree F
Target Transparency (sky brightness)
20.66 to 20.85 mag/arc sec (Sky Quality
Meter)

Seeing 5 (1-10)

**Limiting Visual Magnitude 5.8 (near
Polaris)**

**Polaris Transparency (sky bright-
ness) 20.77 to 20.90 mag/arc sec (Sky
Quality Meter). I started using the
area around Polaris to give me stan-
dardized comparison of sky condi-
tions.**

Stacking - Registax 5, Picture Window
Pro 6 & Adobe Photoshop Elements 9

The Horsehead Nebula

By Paul Walker

The image of the Horsehead (bot-
tom of this page) was taken the same
night as the Andromeda Galaxy.

These days I usually have time to
image only 1 object in a night. This is
because I have gone from being satisfied
with an hour of total exposure time to
trying to get 3 or more hours worth. So
I seldom have time for two objects.
However, with the Sun setting so early,
if it is a Friday or Saturday night, I can
get in a couple objects.

I was not able to use all the expo-
sures I took for Andromeda and the
Horsehead. For the Horsehead at least
40 minutes of exposures were lost due
to the primary mirror frosting up. This
seldom happens to Newtonians. I don't
know if it was due to relatively high hu-
midity and a long night or the humidity
and a slight increase in temperature after
midnight. My record of scope tempera-
tures shows a 3 degree increase between
11:56 and 12:42. I had to bring out a
hair dryer to defrost the scope!

Technical Details:

Exposures taken 2015-12-05, 11:56 PM
to 2015-12-06, 2:35 AM from Middle-
bury, VT

Technical Details:

Exposure- 4 min X 25 (1hr 40min)
at ISO 800

Camera - Modified Canon Rebel XT

Orientation - Landscape w/ north up
but rotated approx. 25 degrees CCW
6 inch f/4.0, 610mm fl

Field of view: 1.32 x 2.02 deg.

SkyWatcher EQ-6 German Equatorial
Mount with Orion Atlas Goto Electron-
ics & Motor Upgrade Kit

Orion Broadband Light Pollution Filter
Baader Coma Corrector (MPCC)

Autoguider- Celestron NexGuide

Guide Scope - 90mm f/13.3 1200mm fl
Maksutov-Cassegrain

Camera Temperature- 27 to 30 degree F

Target Transparency (sky
brightness) 20.30 to 20.52
mag/arc sec (Sky Quality
Meter)

Seeing 4 (1-10)

The scope frosted up part
way through and had to
heat it up. This changed
the focus so most frames
were a little soft.

**Sky conditions near Po-
laris - Limiting Visual
Magnitude 5.8, Transpar-
ency (sky brightness)
20.77 to 20.90 mag/arc
sec (Sky Quality Meter)**

Stacking - Registax 5

Noise Reduction - Noise
Ninja 2

Picture Window Pro 6 &
Adobe Photoshop Ele-
ments 9

Gary's Astronomical Events for the Month

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

Angele on the Radio

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

For Sale / Wanted

For Sale:

**Celestron SP-C80 refractor telescope
and tripod**, rarely used. Comes with the
original manuals, and 3 books on astron-
omy and a viewing the universe tool.

Asking \$350 or best offer.

Contact Aimee Green,
leftlanegreen@yahoo.com

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 bdhinv@yaho.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

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,
spullivan1970@gmail.com
(518) 795-5635

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 \$3500 - **will negotiate.**

Contact Rick@vsbmetal.com
Or you can contact Ron Anstey
anstey@myfairpoint.net

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.
Mike Stadtmauer (704-609-1432)

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

Announcements

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



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 / 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
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 Larwence		453-5496

Editor and Publisher - Paul Walker

Contributors: Larry Garrett, Peter Gillette, Paul Walker, Dennis Woos, Dr. Etha0n Siegel (NASA's Space Place)
(My apologies if I missed anyone)

Dues

Time for Yearly Membership Renewal

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.