

# Morning Star

## Spring 2018



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### New Members

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

Robert Diehl  
Maura Kelley  
Larry Dallamura  
Ron Russotti  
Dana DeWitt  
Sandra Romero Diez

### Meetings/Presentations

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

### April 2

#### Mars - Summer Viewing 2018

(The 2018 Perihelic Opposition of Mars: One of the Top 15 Oppositions Since 1901)

#### Part 2 of 2

By Gary Nowak



Of all the planets visible; Mars is surely the one that has cultivated the most human imagination and interest.

Every 2 years and 50 days, Mars and Earth have "close encounters" with each other. Approximately every 15.7 years, Mars has a closer than typical approach to Earth. In the summer of 2018 Mars will have one of these closer approaches called a Perihelic Opposition (described in more detail in the talk). At that time, amateur size telescopes will have some reasonable views of Martian surface features. Mars is the only planet in our Solar System (besides Earth of course) that we have a reasonable chance of seeing the actual surface features (the Moon doesn't count- it's a moon). Several major Martian surface features are readily visible in a good telescope. Mars is a dynamic planet with surface features that show subtle changes over time due to the effects of the Martian atmosphere. The Martian atmosphere itself displays changes, such as cloud formations and the occasional dust storm. Changes to the Martian ice caps usually can be easily seen. This talk is designed for visual amateur observations through telescopes of 4" - 8" aperture and will cover all aspects of observing Mars. Observing tips and techniques will be shared to help bring out the most of your telescope observations of Mars.

#### Part 2 Outline (April 2018):

- Factors effecting Mars Observations: Instrumental
- Amateur Telescopes for Visual Mars Observations
- Filters for Mars
- Observing Mars: Survey of Various Visual Features
- Changing Mars Phenomena: Atmospheric
- Mars Moons
- Summary

The presenter, Gary T. Nowak is a long time member of the VAS and is

### Fund raising for the Chmela Observatory project

In case you haven't heard about it at a monthly meeting, or read about it in the Morning Star, VAS has been working on plans to build a new observatory at the Hinesburg site in honor of a former VAS member who passed away unexpectedly.

We have some funding in place, but we'll also need your help.

In early April, you will receive a letter with more details.

on the board of directors. His specialty is advanced visual amateur astronomical searches with telescopes and binoculars. The presenter has built several telescopes over the years which included grinding and polishing his own telescope mirrors. His first recorded observations with a telescope were in 1968. He has been observing Mars since 1971. In 1999, he co-discovered a Nova visually with binoculars. He is a member of the Association of Lunar and Planetary Observers (ALPO).

**May 7**

### Annual Banquet & Business Meeting

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

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

The **meal is \$25 at the door**, no charge if not eating.

Location: St. John's Club, 9 Central Ave. Burlington (take Lakeside Ave from Pine St.).

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

### Silent Auction

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

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

**June 4**

### A Tale of Two Observatories By Barry Conolly And Steve Quigley

**Barry-** My talk deals with all aspects of my Skyshed POD observatory project. The first is the ordering, delivery, temporary storage, architectural drawings and permitting of the observa-

## 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.**

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

We have an mail List for Member's interesting in getting a heads up when the Hinesburg Observing Site (HOS) will be opened.

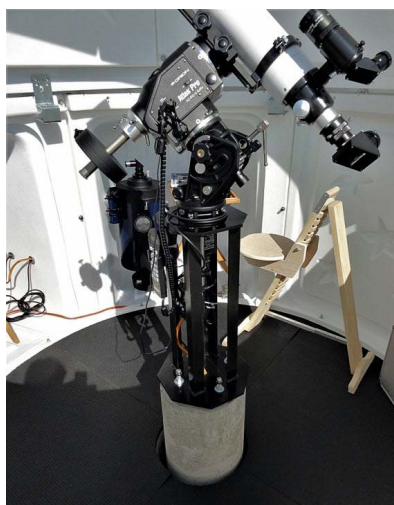
If interested in being on this list contact [info@vtastro.org](mailto:info@vtastro.org)



tory. I then show the concrete pier and concrete slab construction and the assembly of the Skyshed POD's six wall



and four dome panels. Next described are the Orion Atlas Pro AZ/EQ - G mount, Raspberry Pi computer running Raspbian, a Linux OS, with the INDI Protocol, and the Cartes Du Ciel Sky



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

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

If you know of a group or institution that would like to schedule a star gazing session have them contact: [info@vtastro.org](mailto:info@vtastro.org)

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

#### Astro-Imaging Session

**April 7, 8, 14 or 15** at Joe's in Alburg. Presentation starts at 4 PM, night imaging session about 8:30.

**Or April 21 or 22** at Angele's. Includes camera on tripod, camera on tracker, on equatorially mounted telescope, autoguiding, data acquisition, data processing.

**May 11, 12, 13, 19 or 20** Stargazing at Angele's. Scope tune up 7:00 PM, observing starts about 9.

#### Picnic at the HOS

**June 23 or 24**, Starts 3 PM. Bring a dish to share. A grill, Lemon Aid and Ice Tea will be provided by VAS. BYO item to grill. No alcoholic beverages.

**September 15 or 16**, Starts 6:30. Viewing 1st quarter Moon at the HOS and farewell to Jupiter & Mars.

**October 5, 6 or 7**, Starts 6 PM. Dark sky viewing at the HOS.

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



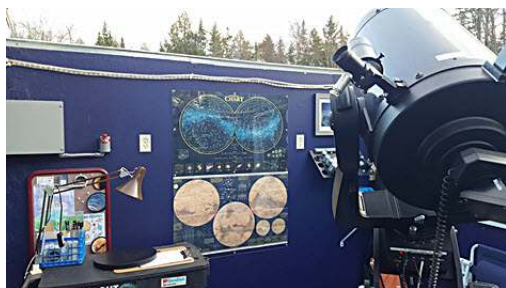
Chart Software. Finally I show the electrical power service, Ethernet cable and the shelving/storage arrangement in the two POD Bay units.

It was a major project for me but I had an immense amount of help from friends, my wife Sharon, fellow VAS member Peter Gillette, and the guys from J and L Hardware. Could not have done it without them.

**Steve** - If you're going to build your own observatory you can choose to purchase a commercial product, or



you can start from scratch. In my case, I chose to research what others had done, and build an observatory starting with a clean sheet of paper. Construc-



tion began in 2013 and the roll-off roof observatory houses my Meade LX-200 12" SCT. Besides the observing area, there is a "warm" room for remote viewing.



My presentation will focus on the design and construction of my observatory. I'll highlight what works well (for me), the lessons learned, and what I would (and may yet) do differently.

## 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**

**Sat, Apr 7** - Castleton University - CU/Unitron Clean-Up Day, with Solar Viewing

**Sat/Sun, Apr 14/15** - Tracy Holman's, Brandon - Messier Marathon (overnight event)

**Sat, Apr 21** - Rockland Community College, NJ - NEAF (National Astronomy Day)

**Thu, Apr 26** - Rutland South Rotary Club - Talk by Cale on the update on the upcoming James Webb Space Telescope, etc.

**Sat, May 5** - Hubbardton Battlefield - Solar, Deep Sky

**Sat, May 19** - Castleton University - Castleton Night of Wonder, Paramount Theater Auction Prize, Dick Swartz

**Tue, Jun 12** - Castleton University - Concert Series

**Jun 14-17** - Cherry Springs Star Party in Coudersport, PA

**Sat, Jun 16** - Hubbardton Battlefield - Solar, Lunar Night, Moon will be up until 11:19 PM

**Tue, Jun 19** - Castleton University - Concert Series

**Tue, Jun 26** - Castleton University - Concert Series

**Tue, Jul 3** - Castleton University - Concert Series

**Sat, Jul 7** - Hubbardton Battlefield - Hubbardton Battlefield Reenactment (special invite)

**Tue, Jul 10** - Castleton University - Concert Series

**Sat, Jul 14** - Hubbardton Battlefield - Mars Night, Sliver of Moon sets at 9:55

**Tue, Jul 17** - Castleton University - Concert Series

**Tue, Jul 24** - Castleton University - Concert Series

**Tue, Jul 31** - Castleton University - Concert Series

## GMA (continued)

**Tue, Aug 7** - Castleton University - Concert Series

**Aug 9-12** - Stellafane - Springfield, VT

**Aug 10-19** - Rockland Astronomy Club Summer Star Party - Plainfield, MA

(<http://www.rocklandastronomy.com/ssp.html>)

**Tue, Aug 14** - Castleton University - Concert Series

**Sat, Aug 18** - Chimney Point State Park - Solar, Deep Sky and Mars Night, Moon below horizon

**Sept 7-9** - Black Forest Star Party - Cherry Springs State Park, PA

**Fri, Sep 7** - Shrewsbury - Russellville Road, Deep Sky

Rain Date: Sat, Sep 8

**Sat, Sep 15** - Castleton University - Homecoming - 2:00-4:00

**Sat, Oct 6** - Hubbardton Battlefield - Solar, Deep Sky Night, Sliver of Moon sets at 5:29

## Articles

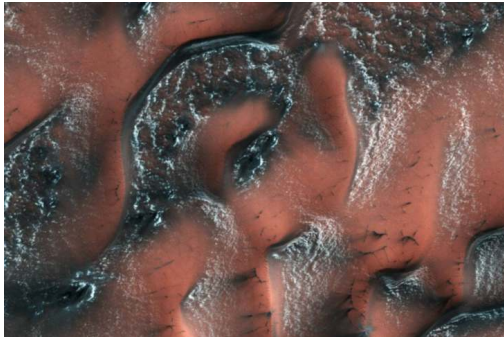


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### Snowy Worlds Beyond Earth By Linda Hermans-Killiam

There are many places on Earth where it snows, but did you know it snows on other worlds, too? Here are just a few of the places where you might find snow beyond Earth:  
 Mars The north pole and south pole of Mars have ice caps that grow and shrink with the seasons. These ice caps

are made mainly of water ice—the same kind of ice you’d find on Earth. However, the snow that falls there is made of carbon dioxide—the same ingredient used to make dry ice here on Earth. Carbon dioxide is in the Martian atmosphere and it freezes and falls to the surface of the planet as snow. In 2017, NASA’s Mars Reconnaissance Orbiter took photos of the sand dunes around Mars’ north pole. The slopes of these dunes were covered with carbon dioxide snow and ice.



NASA’s Mars Reconnaissance Orbiter captured this image of carbon dioxide snow covering dunes on Mars.  
Credit: NASA/JPL/University of Arizona

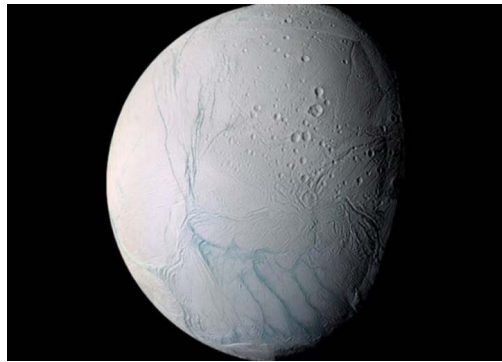
**A Moon of Jupiter: Io** There are dozens of moons that orbit Jupiter and one of them, called Io, has snowflakes made out of sulfur. In 2001, NASA’s Galileo spacecraft detected these sulfur snowflakes just above Io’s south pole. The sulfur shoots into space from a volcano on Io’s surface. In space, the sulfur quickly freezes to form snowflakes that fall back down to the surface.



A volcano shooting molten sulfur out from the surface of Io. Credit: NASA/JPL-Caltech

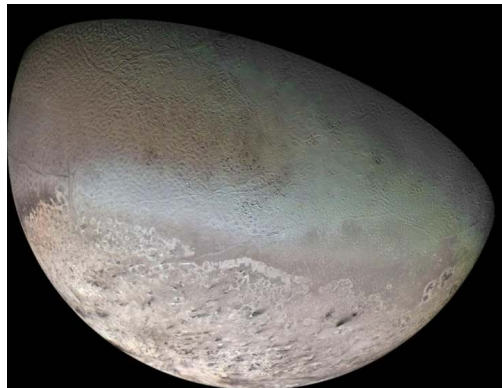
**A Moon of Saturn: Enceladus** Saturn’s moon, Enceladus, has geysers that shoot water vapor out into space. There it freezes and falls back to the surface as snow. Some of the ice also escapes Enceladus to become part of Saturn’s rings. The water vapor comes from a heated ocean which lies beneath the moon’s icy surface. (Jupiter’s moon Europa is also an icy world with a liquid

ocean below the frozen surface.) All of this ice and snow make Enceladus one of the brightest objects in our solar system.



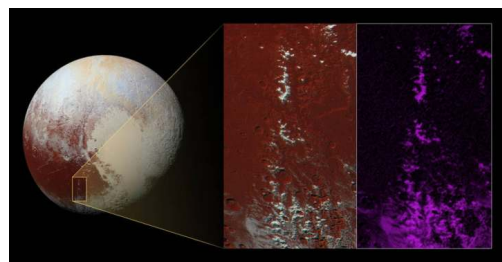
Enceladus as viewed from NASA’s Cassini spacecraft.  
Credit: NASA

**A Moon of Neptune: Triton** Neptune’s largest moon is Triton. It has the coldest surface known in our solar system. Triton’s atmosphere is made up mainly of nitrogen. This nitrogen freezes onto its surface covering Triton with ice made of frozen nitrogen. Triton also has geysers like Enceladus, though they are smaller and made of nitrogen rather than water.



The Voyager 2 mission captured this image of Triton. The black streaks are created by nitrogen geysers.  
Credit: NASA/JPL/USGS

Pluto Farther out in our solar system lies the dwarf planet Pluto. In 2016, scientists on the New Horizons mission discovered a mountain chain on Pluto where the mountains were capped with methane snow and ice.



**The snowy Cthulhu (pronounced kuh-THU-lu) mountain range on Pluto.**

Credits: NASA/JHUAPL/SwRI

**Beyond Our Solar System** There might even be snow far outside our solar system! Kepler-13Ab is a hot, giant planet 1,730 light years from Earth. It’s nine times more massive than Jupiter and it orbits very close to its star. The Hubble Space Telescope detected evidence of titanium oxide—the mineral used in sunscreen—in this planet’s upper atmosphere. On the cooler side of Kepler-13Ab that faces away from its host star, the planet’s strong gravity might cause the titanium oxide to fall down as “snow.”



This is an artist’s illustration of what Kepler-13Ab might look like.

Credit: NASA/ESA/G. Bacon (STScI)

Want to learn more about weather on other planets? Check out NASA Space Place:

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

### M33

By Michael Stadtmauer

M33, or NGC 598, or the Triangulum Galaxy is the 3rd largest member of our local group. It can be found in the Triangulum constellation, near Andromeda. In fact, it has recently been established to be a satellite galaxy to Andromeda. M33 is only about 40% of the size of the Milky Way and contains only 1/10th the number of stars (‘only’ 40 billion). It also has the distinction of being one of (if not the) farthest object visible to the naked eye (but only in very good sky conditions on very dark nights) at 2.7 Mly. Otherwise, besides being a gem of a galaxy in close proxim-





The image was captured through Hydrogen, Sulphur and Oxygen narrow band filters (H,S,O) (as opposed to visual L,R,G,B filters) and the false color processing was done according to the standard Hubble palette. This palette assigns the Sulphur data to red, the Hydrogen data to green and the Oxygen data to blue, which allows us to create an image understandable to the human eye, but not representative of any sort of real world color. Please enjoy!

Equipment is the same as the previous image.

#### Integration times:

S,H,O: 56 x 600s, each

The full size image is available for viewing here:

<https://www.astrobin.com/full/322012/0/>

ity, there is nothing else particularly special about the object.

As I'm sure you all of have noticed, this winter has been particularly brutal for star gazing or astrophotography. This image was taken last fall, near the end of October over a few nights. Total integration time is 17.5 hours.

**R,G,B:** 30 x 600s (10min)

**L (luminescence):** 30 x 300s (5 min)

**Imaging telescope:** Stellarvue SV080ST-25SV .8x reducer flattener in South Burlington

**Imaging camera:** QSI 683 wsg-8

**Mount:** Paramount MyT

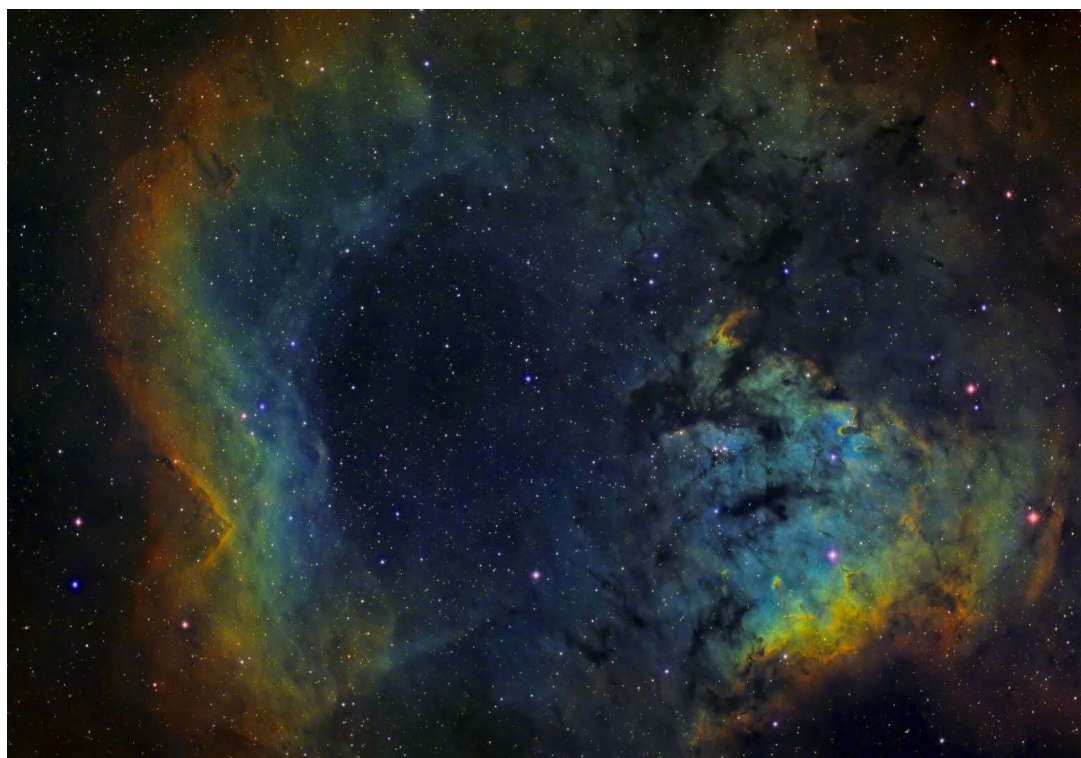
**Software:** Pleiades Astrophoto PixInsight 1.8, Software Bisque The Sky X

The full size image is available for viewing here:

<https://www.astrobin.com/full/319346/B/>

### NGC 7822/Ced 214 By Michael Stadtmauer

NGC 7822 is a young star forming emission nebula in Cepheus, visually near the stars Caph and Navi, about 3,000 light years from Earth. An exceptionally hot binary star system is the main source of illumination, putting out about 100,000 times the radiation of the Sun and shaping the 'pillars of creation'



structures. In the image, NGC 7822 is the triangular structure on the left and Ced 214 encompasses the pillars of creation region on the right but, perhaps obviously, they are part of the same expanding gas cloud.

Half of of the data for this image was captured about a year and a half ago, but I was not happy with the image, feeling it lacked enough data. So, this past fall I captured another 17 hours, for a total over the 2 years of 28 hours.

### Board Talk

#### January

Jack opened the meeting.

Keith gave an update on the new observatory building. He is working on the roll-off sheds while Doug Williamson is working on the deck. Most of the design details have been worked out.

Members have been asking Keith why more star parties are not being

held at the Hinesburg Observing Site (HOS). The Membership Committee made a conscious decision to spread the star parties around at member's homes with the idea of making it easier for more members to attend at least some of the events and because of the lack of amenities at the HOS. Some sites, like Angele's, have been well attended due to location, snacks and a barn.

Due to response from members, the Membership Committee also created an observing list last Fall to give people an incentive to observe and have a shared experience. Many people used this list at a number of the Star Gazing Parties last Fall though only 7 contacted Angele to be in the drawing for prizes.

The next monthly meeting presentation is by Bill Wick (The Rev) on how to collimate an SCT.

We are set for monthly presentations through the Annual Banquet in May.

Paul will book St. Johns Club for our Annual Banquet/Business Meeting in May.

Steve Grimsley has requested to become a Full Member. He has been an Associate Member since 6/2017. Steve is an experienced amateur astronomy who is does astro-imaging. There was no significant discussion.

Bob reported that he hasn't worked for a while on the mirror from a 14" telescope that was donated to club but plans to get back to it this Spring.

Jack asked Bob if he had any plans of having another Telescope Making Class. He does not, there has not been enough interest expressed by members. He did recently help a high school student build a telescope as a school project and help a member grind and polish a simple lens to make a Galileo type telescope.

Paul presented a draft of a document detailing the responsibilities when VAS hosts a Solar Observing Event. We read through it and made a few changes.

Jack gave an update from Gary on the work Gary and Steve Quigley have been doing for People's Academy on an old Fritz telescope that will be re-installed in the Grout Observatory on the school grounds. The clock drive was brought to a clock repair shop and has

been repaired, cleaned and lubricated. The work is expected to be done by the end of February with an open house the end of March of this year.

Gary also sent along his suggestion that the club work with the state to get one state park designated as a Dark Sky Site.

We continued the discussion of whether to have a solar observing event with SunCommon. There is still some concern about having an event with a commercial entity, even one like SunCommon (they install Solar Power Systems).

Jack and Keith checked out the Planetarium at Mt. Abe.

#### MOTIONS:

Paul made the motion that we recommend Steve Grimsley for Full Membership to the Full Members. Joe Comeau 2nd the motion. There was no further discussion. The vote was unanimous.

#### ACTION ITEMS

Paul to send email to Full Members for the purpose of voting on Steve Grimsley for Full Membership.

### February

Jack opened the meeting.

Doug noted that he found a couple errors in the original estimate for the new observatory deck and had missed a couple expenses. He gave us the updated estimate. He recommended we wait until all board members could vote on whether to proceed with the project (see motion below).

We debated the pros and cons of having the deck at 28' versus the original plan of 24'. Keith suggested there is no right answer as to what length the deck should be. We settled on the 28' option.

We discussed the possibility of fundraising within the club for the Chmela Observatory project.

We had further discussion on the "Responsibilities when Hosting Solar Observing Events" document. Gary had sent Paul some suggestions involving training, criteria for inspecting solar filter and type of projection systems that would be allowed. Doug had talked to our insurance agent about the document, their opinion was that it is sufficient as is for providing us suffi-

cient legal protection. It was decided that we include these additional items; no homemade filters, no unmarked commercial filters, no open projection systems, that is setups where a person is able to put an eye or other body part into the light path.

MOTIONS: Since 2 board members were not present, Gary made the motion to conduct the vote on whether to approve proceeding with the Chmela Observatory, via email so that all the board members can participate. Paul seconded the motion. All present voted yes.

#### ACTION ITEMS:

Paul - Change the platform dimension on Appendix C of the Site Plan that was submitted to the town of Hinesburg to 14' x 28'. This will be used as part of the documentation we will submit to the town of Hinesburg to get a building permit.

Paul - Will add the items previously noted to the "Responsibilities when Hosting Solar Observing Events" document.

Jack - Will contact Joe and Bob with an update on the observatory plans. He will later send an email to all board members for a vote on the project.

### March

Jack opened the meeting. Jack reported that he submitting the paperwork to the Town of Hinesburg for a building permit for the Russell Chmela Observatory. The town posted a notice at Observatory Road on 3/13/18. If the permit is not contested we will receive the permit on 3/28/18.

We OK'd adding a link to the Governor's Institute on Astronomy.

The Annual Banquet/Meeting is set for May 7th at St. Johns club. Paul will inquire with them to find out whether they have other dinner options to consider. Keith has started collecting donated astronomy items for the silent auction. Discussed raising the price we charge for the dinner to \$25, the amount it actually costs the club.

Keith delivered Library Loaner Scopes to Fairfax and Milton libraries.

Joe talked about our plans for participating in Earth Hour on March 24. We will have scopes set up at the head

of Church St. as usual on the property of the Unitarian Universalist Church.

Milton Library has scheduled a stargazing event for May 24. Joe will have a slide show available as well.

Joe asked if we should have an astro-imaging session soon (including outside, hands-on activities). The logistics may be difficult. The suggestion will likely be discussed more at the Membership Committee Meeting on March 27.

Bob has his interferometer back on-line so his is ready to continue working on the mirror of the donated 14" Cave Newtonian.

Gary is very close to completing the work on the mirror from the Russell Chmela scope. He brought up a couple names for awards at the Annual Banquet/Meeting.

Paul - Presentations for monthly meetings are good through June. Working on presentation for July, 2 mini-talks - Atmospheric Phenomena by Mark Moyer and Meteors by Steve Grimsley, August - Modifying Commercial Dobsonians (to improve function) by Paul Walker and September (TBD).

We discussed how much to try to raise via donations toward optional features that we want to include in the Chmela Observatory Project.

Paul gave a summary of the fundraising plan. We will canvass the board, Site and Chmela Committee members for pledges for the fund-raising. After we get the building permit we will send a canvass letter to the membership.

The webmaster (Paul Marino) submitted proposed changes for the home page on the web site. He also proposed using Google Calendar to record and display our events instead of writing them directly onto the Events pages. The board approved making these changes. Paul W. suggested we put the document about the VAS host's responsibilities at public Solar Observing Events onto the web site. The board agreed.

The positions of President, Vice President and the 4 Board members at large are up for election. All put their names in for re-election. Jack or Paul will send a notice to the membership to see whether anyone else is interested in any of these positions.

## MOTIONS:

Paul made the motion that we increase the amount we charge member for the meal at the Annual Banquet/Meeting to \$25. Jack 2nd the motion. The vote was unanimous in favor.

Paul made the motion that we approve the proposed budget for the Chmela Observatory. Gary 2nd the motion. The vote was unanimous in favor.

## VAS Membership Committee

There was meeting on March 27 but there was not enough time to get the minutes into the newsletter.

## Site & Russell Chmela Committees

### January

Paul opened the meeting. He read portions of the previous meeting minutes and read the agenda for this meeting.

Doug did a presentation on the design and details of the deck portion of the Russell Chmela Memorial Observatory. There was some discussion of details. Discussed having 20" square telescope piers (requires us building forms for the concrete) vs. 12" round piers (uses sonotube for the form). Opted for the 20" square for rigidity. Gary suggested we incorporate electrical conduit in case we get AC power to the site at a later date. The consensus was that conduit could be added externally easy enough if we ever do get power. We went over Doug's detailed list of materials and costs including delivery of the concrete for footings and piers. Most of the costs are quoted costs a few are estimated. Total estimated cost for the deck comes to \$xxxx.

Keith did a presentation on the design and details of the roll-off shed portion of the project. He covered the size of the buildings and of the doors and the mechanisms we will use secure the builds when closed among other details. Estimated cost for each shed is \$xxxx.

Total estimated cost is \$xxxxx.

The committee members are in agreement that we are ready to recommend to the Board that we proceed with the project.

**Next steps:** Present this to the Board for their consideration for approval of the plans and approval to proceed with the next phases of the project (See February Board Minutes). Assuming the Board approved, apply to the town of Hinesburg for a building permit. Doug will complete the detail drawing by adding dimensions to framing drawing and drawing the details for the surface of the deck which will be panelized sections of 2x4's with Trex® deck boards.

### February

Shortly after starting the discussion of adding 3 feet to the deck, a suggestion was discussed to build separate decks for each scope to better separate the scopes. Both suggestions would add cost. Adding 3 feet would be fairly straight forward and cost a few hundred more. 2 decks would require a fair bit more work, even more cost and delay the start of construction. We would have to submit a new site plan to the town for approval. This could take several months. This prompted Paul to give a review of where we started and how our plans have evolved over time.

First - A few details not included at this meeting but included here for the membership at large. The process started over 2 1/2 years ago. A long time, former member and officer of VAS, Russell Chmela, passed away unexpectedly. When Russ moved away due to work back in the 90's, he left behind a special telescope he built, including grinding and polishing the primary mirror. He left this scope with the VAS. When his parents learned that we had this scope, they offered to give VAS a notable donation if we were willing to use the donation to build an observatory to house Russ's scope in tribute to their son. The Board accepted the offer.

Covered at the meeting - About 2 1/2 years ago this committee started working on the design for the memorial observatory. Initially we were going to build a roll off roof observatory similar to but slightly larger than the current observatory. It was then discussed whether we should also build a new observatory for the 18" designed to be a better fit than the current building



(the current building is not a good fit for Russ's scope). We worked on designs for both buildings. Last summer we decided the cost for 2 buildings was more than the club should tackle. It would require substantial fund raising. We still wanted to include new housing with more space for the 18". It was suggested that a large deck with 2 roll off sheds might fit the bill and likely fall within a reasonable cost. The cost estimate for the deck and 2 sheds was deemed reasonable.

For this meeting Keith had made cardboard mockups of the sheds and wooden mockups of the scopes to the scale of Doug's deck drawing. This helped tremendously in visualizing the layout and the effect of the proposed change. There was consensus to stay with the 1 deck but add a few feet to the length. Doug did a preliminary estimate and will do a more accurate calculation of the new cost, it is expected to add a few hundred dollars. The updated plan and estimate will be presented to the board on 2/27/18.

Gary gave an update on work on the primary mirror for the Russell scope. He is confident that he can complete the re-figuring of mirror in time to install the scope in the observatory.

We briefly discussed contingency plans in case the observatory is ready before the scope. We reminded ourselves that the plan includes being able to readily swap the Russell scope for a donated 14" Newtonian. This will also be the contingency scope. Bob Horton is currently re-figuring the mirror for the 14".

We completed reviewing questions for the Site Survey. Paul will update the file and send it out to the committee members for a trial run, final tweaks and get estimates for how long it takes to fill out. The plan is to use Survey Monkey for the survey and to have it ready sometime in March, April at the latest (will be working on the newsletter in March as well).

#### ACTION ITEMS

Doug- update deck plans and cost estimate before Board Meeting.

Paul- update Site Survey, send to committee members, publish on Survey Monkey

#### March

Paul read the meetings of the last meeting and the agenda items for this meeting.

Paul gave update on the pertinent actions from the Board meeting.

Doug gave an update on his work on the deck details. He has done the detailed drawings for the footers and framing of the deck. Updated us on the increases and decreases in the cost estimate which added up to an insignificant change.

Keith updated us on the roll-off sheds. We discussed some details like what to use for siding, T-111 or synthetic material. Will likely use synthetic due to no need for long term maintenance. We can start construction of the sheds at Keith's house as soon in April as the weather allows. A reminder- we can't order the garage type doors for the sheds until the framing is done (the vendor needs to be able take measurements). Doug and Keith will coordinate which vendors to use to maximize potential savings in material costs.

Discussed including a fund-raising end date in the fund-raising letter. The decision was no.

Discussed the potential of wheels on the roll-off sheds lifting off the rails due to the deck footings shifting over time. The garage type doors may also have issues if the sheds twist if the deck shifts. We will likely add bracing inside the building to stiffen them. The deck supports will allow for shimming if needed if the footings shift over time. Checking the deck for shift will likely be an item for regular maintenance.

We discussed some of the construction details and how much and what type of help will be needed for some of the steps.

#### Observers Page

#### The Super-Moon, Blue-Moon, Total Eclipse of the Moon

Only the partial phase of the eclipse was visible here as the Moon was setting. Angele Mott-Nickerson and Joe Comeau ran into each other down on

Shelburne Beach to take pictures of the event.

The pictures below were taken by Angele with her Sony A58 DSLR. The images are crops from the original images with some additional image processing by Paul Walker.



#### Tech Details:

1st image - 150mm at f4.5, 1/13 sec., ISO 100

2nd image - 80mm at f4, 1/200 sec., ISO 400





**Super Blue Moon Eclipse  
at Shelburne Beach  
Jan. 31, 2018**

The montage above and the image below were done by Joe.



### Asteroid News from Larry Garrett

At the March monthly meeting Larry reviewed his observation of the occultation of TYC 811 1971 by asteroid 1940 Whipple.

“This ultra rare grazing occultation was observed from my home using a Celestron 8 telescope, at 5h 08m UT, February 13. As I was just 2.4 miles from the southern shadow path, a very short event was predicted. The brief eclipse was under one half second long, perhaps 1/8 to 1/4 sec. long, a flash of light rarely seen visually or imaged.

A second asteroid reviewed was named in my honor by retired professional astronomer Richard Hill, one of his many discoveries. He presents the following award to people for whom he

has named asteroids to honor their efforts. Asteroid 28475 2000 CU became 28475 Garrett. I was informed by Richard on February 7.”

Note: Contrary to the certificate below this was announced in Minor Planet Circular #108697.

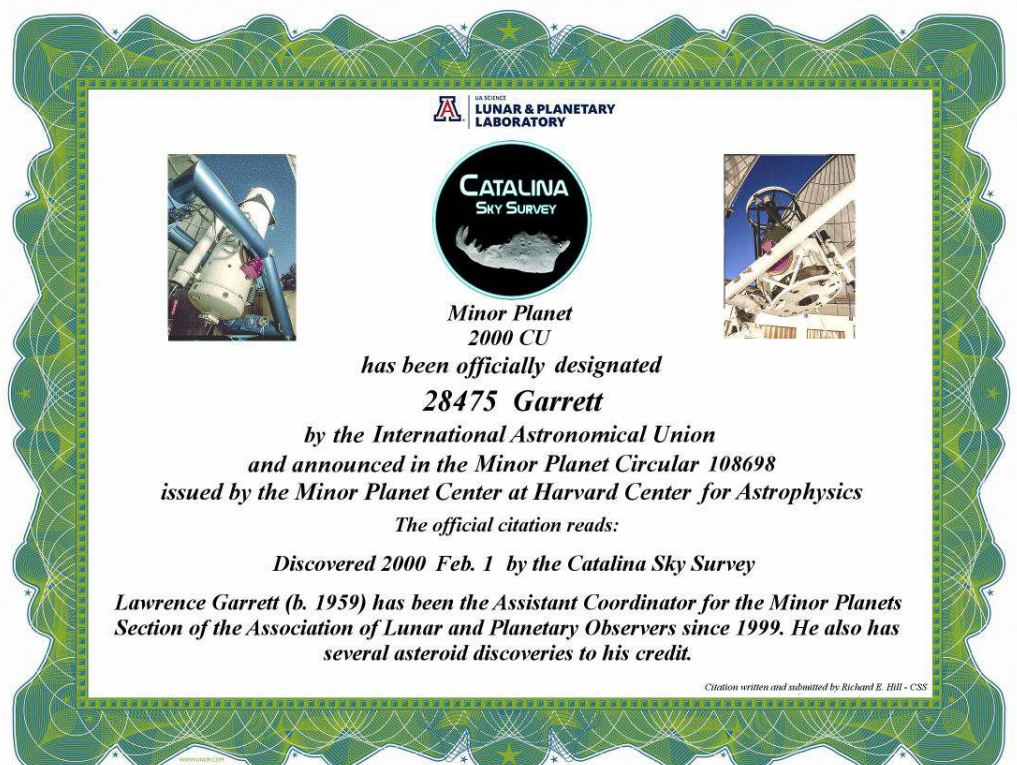
### **An Almost Occultation and an Actual Occultation By Paul Walker**

With a 10” telescope many occultations of stars by the Moon are visible. This is because of the light gathering power. Fainter stars are visible than with a small scope. That said these 2 events would have been visible in smaller scopes.

On 11-24-17 I was checking out the 6.5 day old crescent Moon when I noticed a nearby star. It looked like Moon may pass in front of it. I went inside to my computer, fired up Starry Night Pro to check it out. It was a 6.1 magnitude star but it was not going to be an occultation. However, it was going to be a very near miss (by a mere 22 seconds of arc).

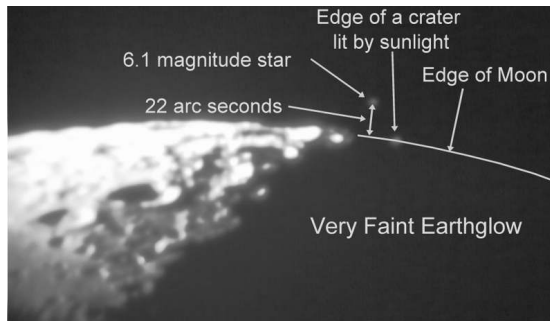
I knew my camcorder could get down to about 11<sup>th</sup> magnitude on the 10” so I attached it to a 32mm eyepiece.

I took 5 minutes 22 seconds of video as the Moon drifted by. The image on the next page is a stack using 10 sec-



onds of this video (300 frames). The time was approximately 6:00 PM EST.

The star is HIP103703 in Capricorn, 1 deg 14' 59" WSW (Position angle 265 deg) from Theta Capricornus.



### Equipment:

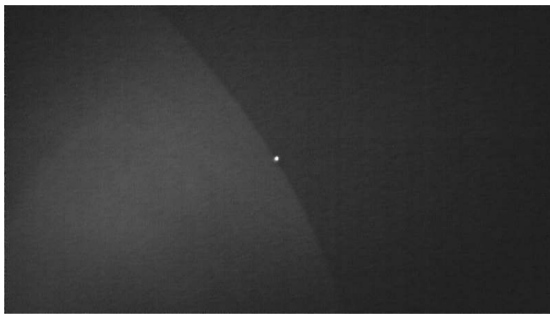
10" f/5.6 Newtonian

32mm Konig eyepiece (44x)

Canon HF21 HD camcorder at approx 12x (for a total magnification of 530x)

A little later that evening I observed the occultation of a fainter star. The time was approximately 8:26 PM EST. It was easy to see against the faint Earth glow.

This star is TYC6350-1098-1 (7.2 mag) located 16' 15" WSW (Position angle 285 deg) of Theta Capricornus.

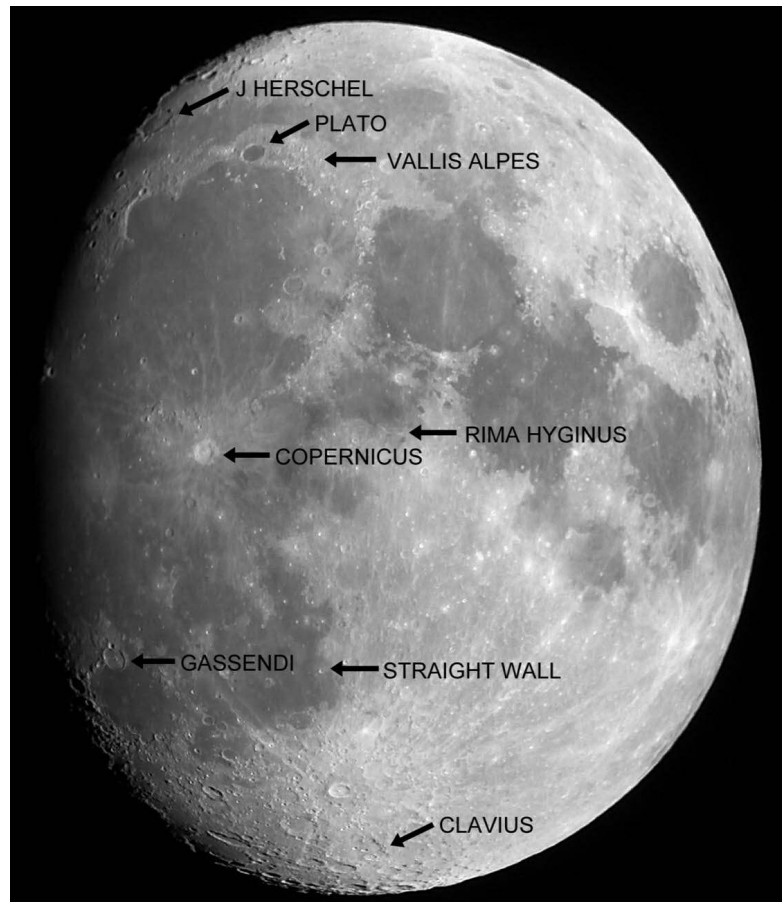


This is a stack of 230 frames just before the star disappeared behind the Moon, same equipment and magnification. The integration time (exposure time) was 1/8 second compared to maybe 1/30 or 1/60 sec for the almost occultation.

### More Moon Fun By Paul Walker

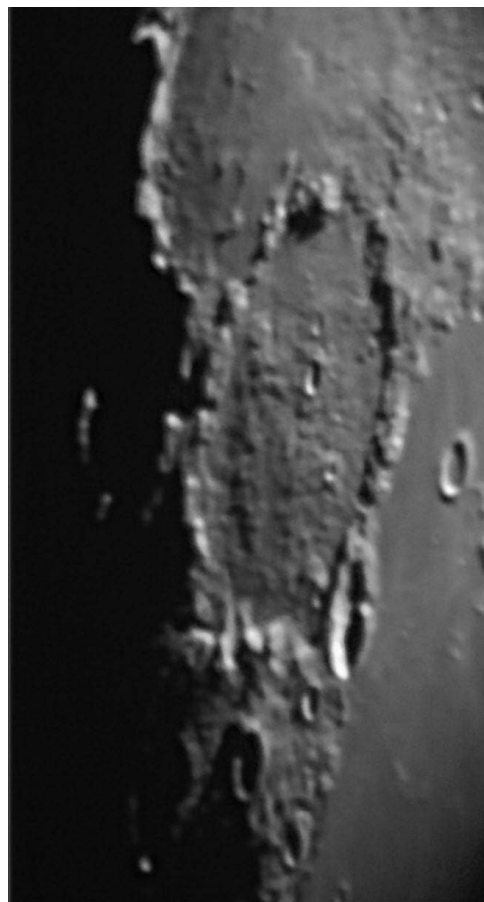
I think I am getting spoiled by looking at the Moon. The most difficult part is finding a good steady night.

For anyone who hasn't noticed (I had forgotten), Winter through Spring are the best times for Moon viewing. This is because this time of year the ecliptic is very high in the sky in the evening. Since the planets and Moon



don't stray very far from this imaginary line the Moon is well above the horizon from before first quarter to after full.

The image above shows the locations of some of the features I have imaged recently. All images are oriented with North up.



J Herchel Crater 2/28/18  
~1200X, stack of 200 frames



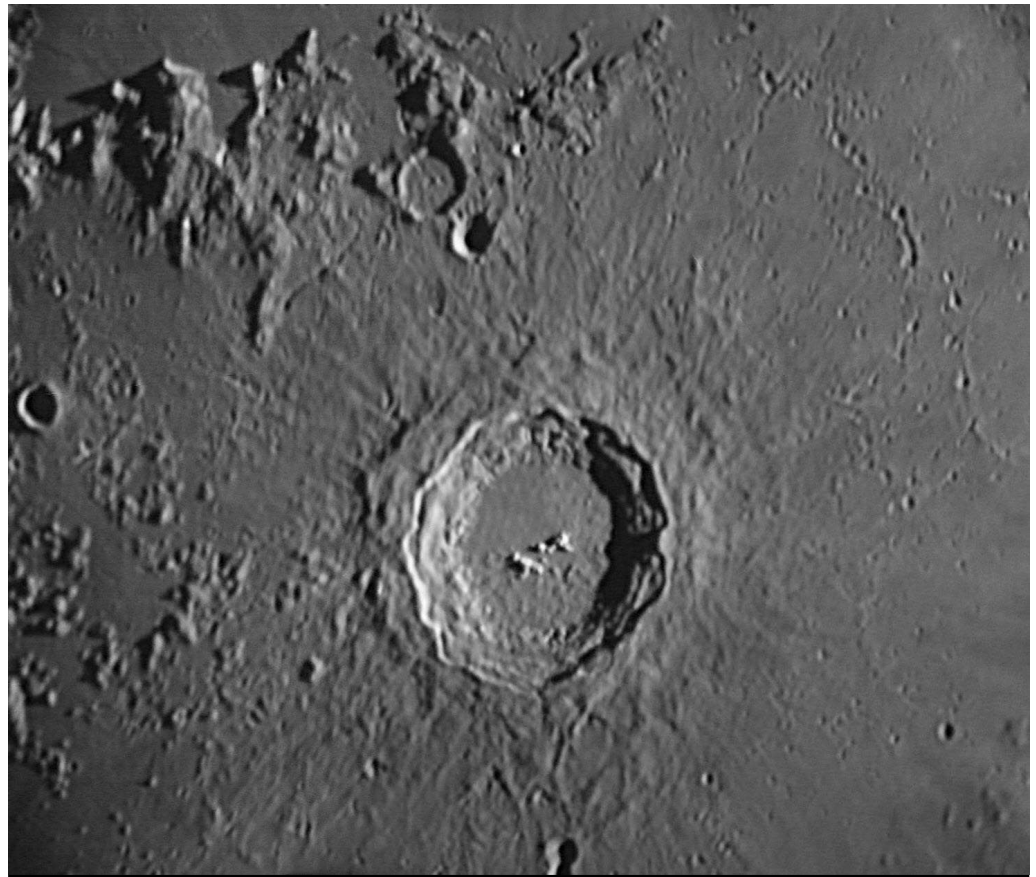
Gassendi Crater 2/28/18  
~1200X, stack of 300 frames



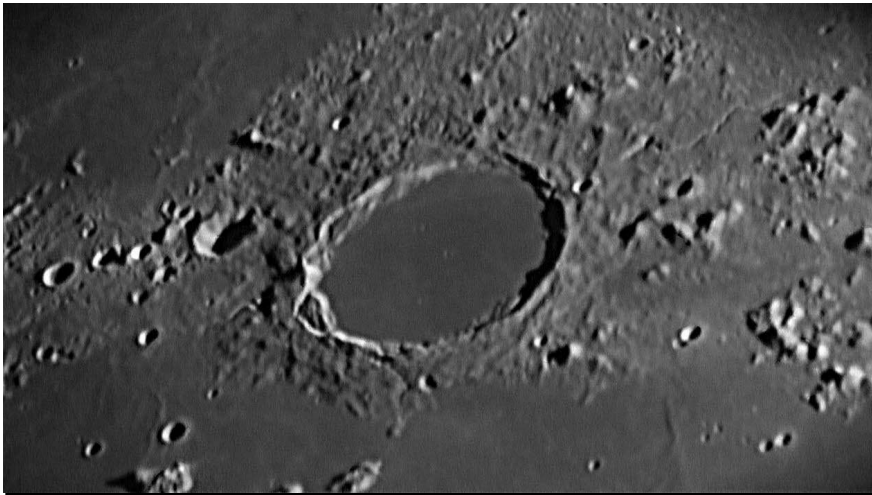
J Herchel is an old crater with worn down walls and lava flooded floor. It appears that the lava was covered later by debris. The smallest features visible are about 2 miles across. The smooth area to the bottom right is the northern end of the small impact basin Sinus Roris.

Gassendi is also an old crater next to a flooded impact basin (Mare Humorum). Fault lines are visible on the edge of Mare Humorum. Gassendi has similar fault lines some of which are faintly visible as light colored lines to the lower right of the central peak. The 2 light colored spots to the lower right of the peaks (1/3 and 2/3 to the crater wall) are craters 2 miles in diameter. For reference, at the distance of the Moon 1 mile is approximately 0.9 arc sec. So these craters are about 1.8 arc sec across.

Those images were taken on February 26, 2018 when the Moon was 11.2 days old. My next opportunity was March 25, 2018 but since the next day,



**Coperincus Crater 3/26/18**  
~1200X, Mosaic of 3 images, each a stack of 300 frames



**Plato Crater 3/26/18**  
~1200X, stack of 300 frames

March 26, 2018 (9.5 day old Moon), had notably steadier seeing I haven't bothered processed and any of the March 25 video clips.

The seeing (air steadiness) was good enough on March 26 that I could visually see and image features 1 mile or less. Rima Birt, just a little West of straight Wall was fairly easy to see most of time and is 1 mile wide (see image on page 12). The good seeing came and went in waves so I had to keep watching to pick out the smaller details.

I am pretty sure these images show more details than any other images of the Moon that I have taken to date.

When I processed the image of Plato I noticed several tiny craters on the smooth floor. I was surprised because I did not see them when I viewed it visually. Using the Lunar Chart (LAC) Series, the largest of these is 1.5 miles across and the smallest 1 mile.

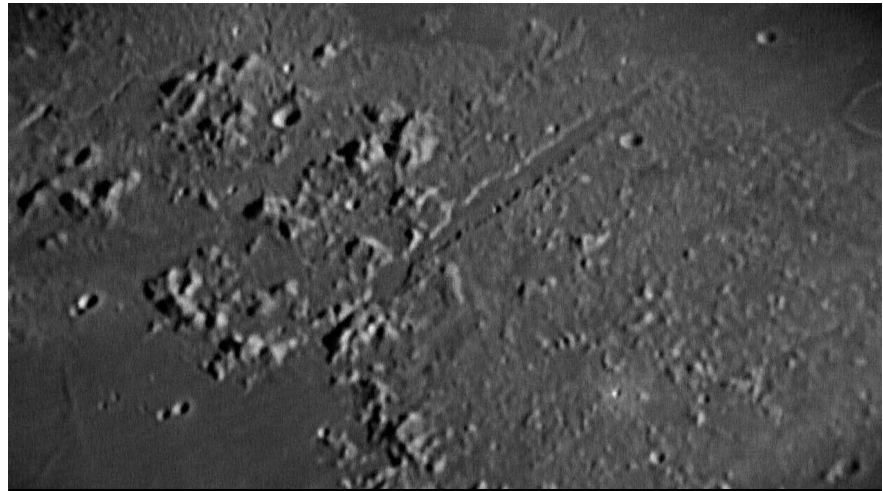
Another feature that I did not see but was likely visible is Rima Plato, the wiggly line to the upper of of the crater. This is a 1 mile wide rille, something to look for next time.



**Rima Hyginus (Hyginus Rile) and Hyginus Crater 3/26/18**  
~1200X, stack of 300 frames

In the image of Copernicus notice the strings of craterlets to the upper right and upper left. These were created by debris drudged up by the asteroid that created Copernicus.

Rima Hyginus is a rille believed to be produced by the collapse of a lava tube. The part of the tube to the east is completely collapsed forming a valley. The western section is partially collapsed forming what appears to be a string of craterlets. Between these two is Hyginus Crater and portions that did not collapse. Hyginus crater is believed to have been caused by volcanic activity and not an impact. The lava tube is actually partially collapsed between the places with craterlets, it is just not visible in this image.



**Vallis Alpes (Alpine Valley) 3/26/18**  
 ~1200X, stack of 300 frames  
 Parts of the rille in the middle is just barely visible in this image.  
 It is only 0.37 miles wide.  
 Compare it to a reference image from the Lunar Reconnaissance Orbiter, below right. Top image is a cropped from the LRO image, it is blurred (center) to more closely match the resolution of my image (bottom)



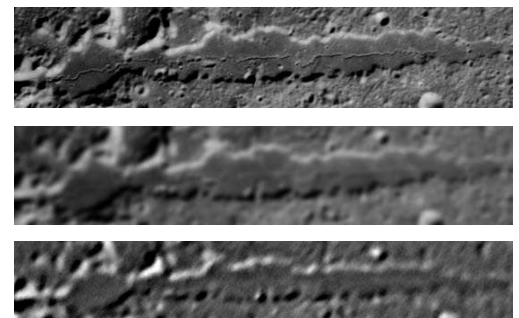
**Straight Wall & Rima Birt 2/28/18**  
 ~1200X, stack of 300 frames

The Straight Wall is best viewed when when the Sun angle is fairly low. This goes double for Rima Birt next door (the linear feature starting just above the largest crater and going to the upper right). I was surprised to see and be able to image Rima Birt with the Sun so high above it.

Every time I view the Alpine Valley I look hard for the rille that runs down the middle of it. I have never been able to see it visually.

I didn't think my imaging captured it either. However, when I pushed the processing more I could see something there. It could have been just an image processing artifact. On-line I found some images from space probes showing the rille. One from the Lunar Reconnaissance Orbiter (LRO) has almost the same orientation and Sun angle.

I blurred the LRO image to reduce the effective resolution. In the small images to the upper right you can compare mine to them. There are sections



that are just barely detectable in my image. My image is on the bottom.

The image below is my favorite feature, or group of features really, Clavius and the aesthetically curving row of craters within it. Even in poor seeing they look nice.

An added benefit is a dozen or so smaller craters that are visible to varying degrees depending on the Sun angle and seeing.



**Clavius Crater 3/26/18**  
 ~1200X, stack of 300 frames



**Equipment used:**

10" f/5.6 Newtonian (1407mm fl)  
 32mm eyepiece (2 in.)  
 2x Barlow (2 in.)  
 Canon HF-21 High Def. Camcorder at  
 15x zoom.

**Calculation of magnification:**

$1407\text{mmfl}/32\text{mm} \times 2$  (2x Barlow)  $\times$   
 $15\text{x}$  (zoom) = 1320x. This assumes the  
 effective focal length (FL) of the video  
 camera when zoomed all the way out is  
 50mm. It is close, the manual lists it as  
 48 mm. This gives an magnification of  
 $(1320 \times (48/50)) = 1267\text{x}$ .

The FL reference used is the "old"  
 Single Lens Reflex (SLR) camera using  
 35mm film where a 50mm lens was  
 standard and gives approx. a 1X view  
 in the viewfinder. With this, a camera  
 with a 50mm lens looking into an eye-  
 piece will give the same view as your  
 eye. The camcorder at 15X zoom has  
 an eff. FL of  $(48\text{mm} \times 15 = 720\text{mm})$ .

The complete equation for the  
 magnification of the system is  
 $1407\text{mm}/32\text{mm} \times 2$  (for the Barlow)  
 $\times (720\text{mm} / 50\text{mm}) = 1266\text{x}$ . These  
 calculation works for other digital cam-  
 eras as well.

**A second method for calculating magnification using this equipment:**

To double check, I used mea-  
 surements from the picture of  
 Copernicus, the known size of this cra-  
 ter and calculations of it's angular size  
 at the time the image was taken. I am  
 making the assumption the reader fa-  
 miliar with trigonometry.

Distance of the Moon on 3/26/18  
 was 363,434 Km or 225,827 miles. At  
 this distance 1 mile = 0.913 arc sec.  
 The calculation is - Tangent of an angle  
 = opposite/adjacent so  $1\text{ mi}/225827$   
 $\text{mi} = 0.000004428$ . The arc tangent of  
 $0.000004428 = 0.0002537\text{ deg.} = 0.913$   
 arc sec

The diameter of Copernicus is 56  
 miles,  $0.913\text{ arc sec} \times 56\text{ mi} = 51.1\text{ arc sec}$

Measurements from the image on  
 the computer screen: Copernicus =  
 95mm. Long dimension of image =  
 335mm, in arc sec it is  $51.1\text{ arc sec} \times$   
 $(335/95) = 180.4\text{ arc sec}$

$180.4\text{ arc sec} = 0.0501\text{ deg.}$

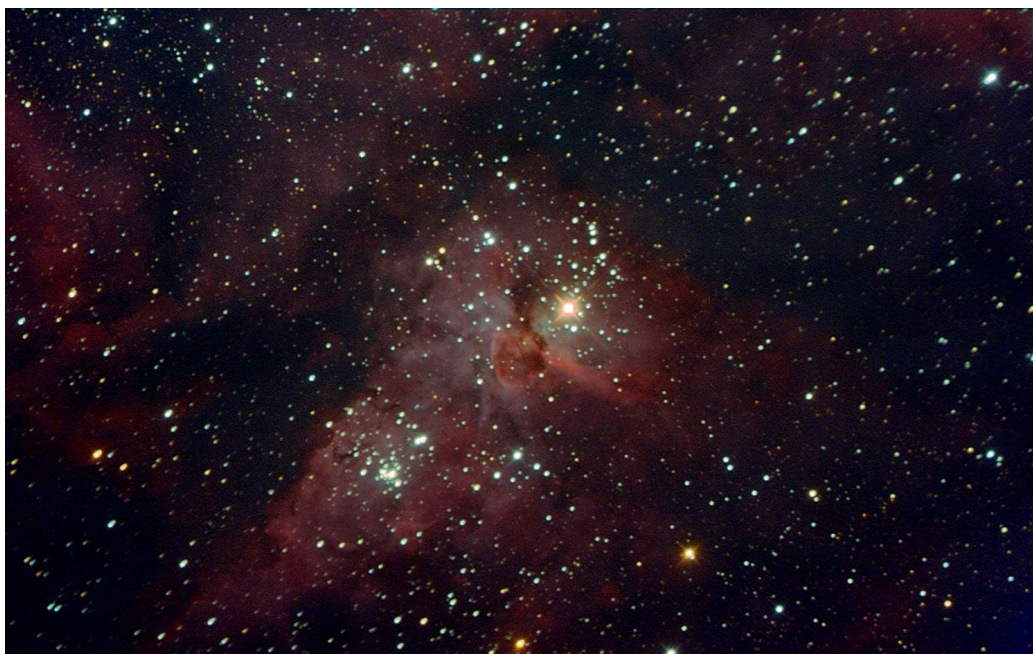
Eff. magnification (assuming 60  
 deg apparent field of view in an eye-  
 piece) =  $60 / 0.0501 = 1197\text{x}$ .

**Pictures From Puerto Rico**

**By Joe Comeau**

Once again Joe and his wife went  
 to Puerto Rico this winter. He

shipped his Astrotech RC6 scope and  
 Celestron AVX mount so it would ar-  
 rive before they did.

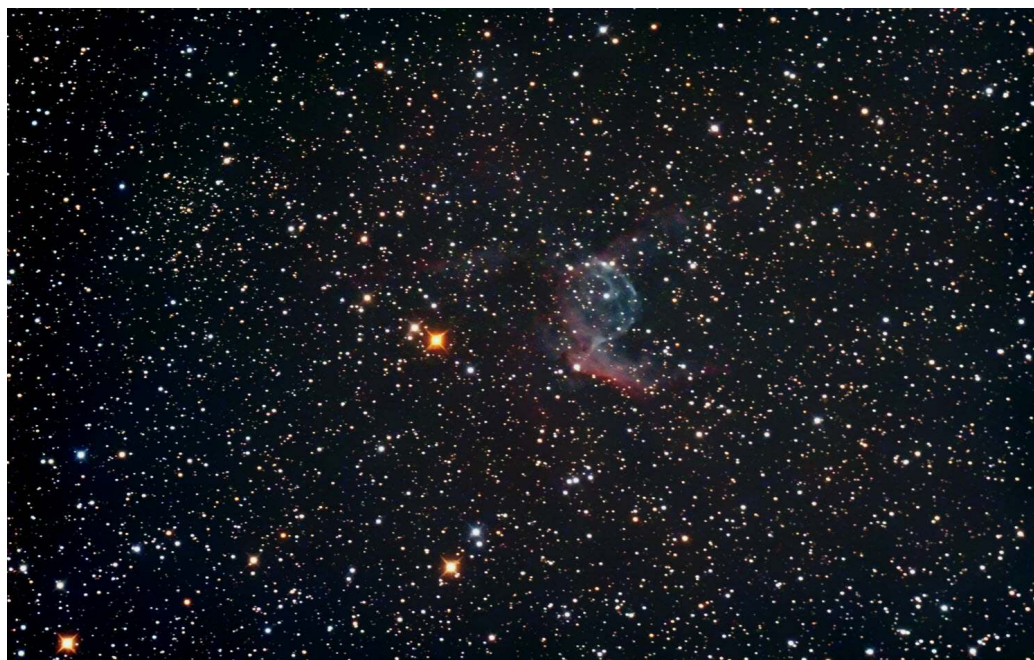


This is the center of the Carina Nebula at nearly 60 degrees south latitude.  
 This image is 128 one minute exposures, unguided using my Canon XT at ISO 1600  
 and a 6" F/9 Astrotech RC (Ritchey-Chrétien) scope.  
 I used my Celestron AVX mount which has a polar alignment function which allows for an  
 easy and accurate alignment.



Here is a picture of the Horsehead Nebula.  
 It is 172 one minute frames with the Canon XT guided using an Orion Autoguider pro and a  
 50 mm guidescope. It was taken with a 6" F/9 Astrotech RC on 3/1/18 and 3/5/18. I have  
 taken this before but with Orion straight overhead, it was tempting to take it again. The pic-  
 ture is cropped from a larger image.





This is of Thor's Helmet, NGC2359.  
I took it with a 6" F/9 Astrotech RC.  
It is 34 two minute unguided exposures taken with a Canon XT at ISO 1600.  
This is a difficult object to image and I try every time I go south.



Image provided by Tim Connolly



Image provided by Tim Connolly



Image by Maura Kelly

### Successful Earth Hour Event

Several members participated in Earth Hour this year. As usual we set up in front of the Unitarian Universalist Church at the head of Church St. in Burlington, VT

Tim Connolly, Jack St. Louis and Joe Comeau arrived early in the afternoon to show the public the Sun. Both in "white light" and hydrogen-alpha telescope. Tim has some of his solar images set up for the public to see.

That evening the first quarter Moon was a prime target for viewing.



Image by Maura Kelly



### 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. Airls the first Wednesday of the month at 8:40 AM.

### For Sale

#### Celestron SkyProdigy 90 mm Maksutov-Cassegrain

Computerized  
Focal length 1250 mm  
F/ratio 14

Two eyepieces: 9mm, 25 mm  
Moon filter: 1.25"

Excellent condition

**Asking \$130.0**

Contact: Jim, [jhwbs97@gmail.com](mailto:jhwbs97@gmail.com)  
608-695-1652

#### Celestron CGE Mount, \$1200 obo

Includes base (no tripod) with two 20lbs counterweights and AC & DC power cords.  
Mount has received a complete Hyper-Tune by Ed Thomas at [deepspaceproducts.com](http://deepspaceproducts.com)  
I replaced the problematic Celestron RA/Dec cables with Gary Bennet 6 point midi style cable replacements.

Steve Yerby  
[syerby@gmail.com](mailto:syerby@gmail.com)

#### Explore Scientific 80mm f/6 Apo- chromatic Triplet Refractor Tele- scope (FCD100 ED). Paid - \$600.

**Asking \$350.**

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

**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](mailto:leftlanegreen@yahoo.com)

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

Equatorial mount with oak tripod

2", 20mm Nagler type 2  
2" 45deg. righting prism  
2" Big Barlow  
2", 4.8mm Nagler  
1-1/4", 26mm Plossl  
2", 45deg. Prism camera adapter

**New Price \$1950 - will negotiate.**

Contact Richard Cummings at  
[Rick@vsbmetal.com](mailto:Rick@vsbmetal.com)  
Or you can contact Ron Anstey  
[anstey@myfairpoint.net](mailto:anstey@myfairpoint.net)

**Celestron 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 \$50 (new price).**

Al Boudreau 802-758-2221 or  
[astromanvt@gmavt.net](mailto:astromanvt@gmavt.net)

**Celestron Power Tank** 17Amp 12  
VDC Outdoor battery (list \$115)---  
**\$50** or nearest offer

**Celestron EclipSmart Solar Binoc-  
ulars 10x42** (list \$70)---**\$30** or near-  
est offer

**Bower Binoculars/Camera Tripod**  
59" (list \$30) ---**\$15** or nearest offer

**All the above are in excellent condi-  
tion**

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

#### Telescope mirrors and a couple mounting cells

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

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

**8"**, probably f/8, in nice **cast alumi-  
num cell**.

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

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

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

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

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

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

#### Meade 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  
\$150 (new price).**

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

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

**Asking \$450** with the accessories listed.

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

**Orion VersaGo III alt-az mount** with slo-mo controls. 18 lb capacity. Works great. Some cosmetic damage from previous owner that doesn't affect performance. **\$120.**

Contact Paul Marino  
paulstevemarino@gmail.com

**AstroTech 6" Ritchey Chretien OTA only. \$250 obo**  
With Losmandy dovetail

Steve Yerby syerby@gmail.com

## Wanted

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

## Outreach

### Acknowledgement Letter

To help in recording our broad community involvement with public star gazing events, projects and classes, we have developed an outreach Acknowledgment Letter with a Sample Form. It is posted on the website and can be **found under Members, VAS Club Materials for Members, Outreach Acknowledgement Letter.**

We encourage you to use it any time you interact with the public. Having a folder of proof of what we do helps when we ask for donations for events and projects. Many people have never heard of us and have no

clue of the extent of the knowledge and time we freely give to the public.

Please print it out and give it to the event coordinator you are working with or fill it out yourself to record your event. Thank you for helping us document what we do.

**Direct Link:** [http://vtastro.org/wp-content/uploads/2018/03/VAS\\_Outreach\\_Ack\\_Letter\\_V3.pdf](http://vtastro.org/wp-content/uploads/2018/03/VAS_Outreach_Ack_Letter_V3.pdf)

## Hinesburg Observing Site

We have an observing site in Hinesburg, VT. (Located on town property)

Any member can obtain a gate key. Full members can also get an observatory key.

### Requirement for Gate Key:

- o Associate member for at least 3 months.
- o Recommended for key issuance by 2 or more full members.
- o Approval of the Board of Directors by a majority vote.

### Requirement for Observatory key:

- o Must be Full Member
- o Training and/or demonstrate competence on the observatory equipment you will be using.
- o Make entries into the Observatory Logbook.

We have an mail List for Member's interesting in getting a heads up when someone will be at the Hinesburg Observing Site (HOS).

If interested in any of the above contact [info@vtastro.org](mailto:info@vtastro.org)

## 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

## Announcements

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

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

## 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 and Webmaster

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

### Moving or Changing Email?

Please send changes to Paul Walker, 53 Valley View, Middlebury, VT 05753, paulwaav@together.net

### Web Site

[www.vtastro.org](http://www.vtastro.org)  
Email: [info@vtastro.org](mailto:info@vtastro.org)  
Paul Walker is the webmaster:  
[webmaster@vtastro.org](mailto:webmaster@vtastro.org)

### Board Members

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

Editor and Publisher - Paul Walker

Contributors: Joe Comeau, Larry Garrett, Linda Hermans-Killiam (NASA's Space Place), Angele Mott-Nickerson, Mike Stadtmauer, Paul Walker, (My apologies if I missed anyone)