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The StarGazer

Newsletter of the Rappahannock Astronomy Club No. 2 Vol. 11 August–October 2022

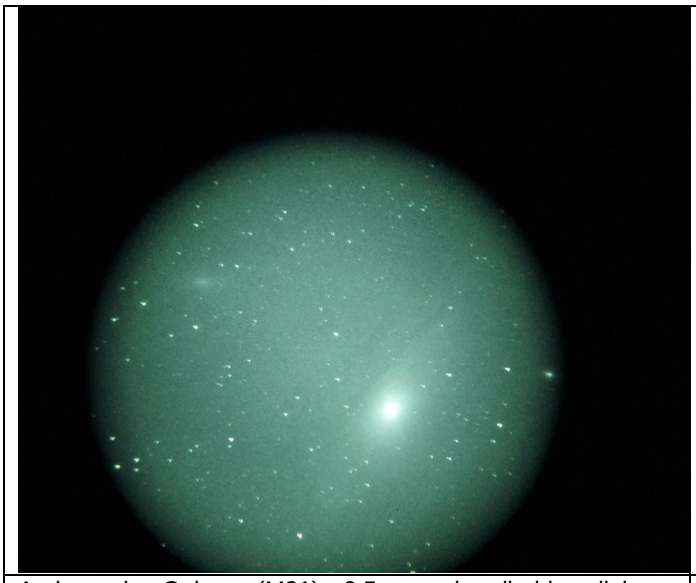
This Can't Be Real—Night Vision Astronomy

By Corey Dallmeyer

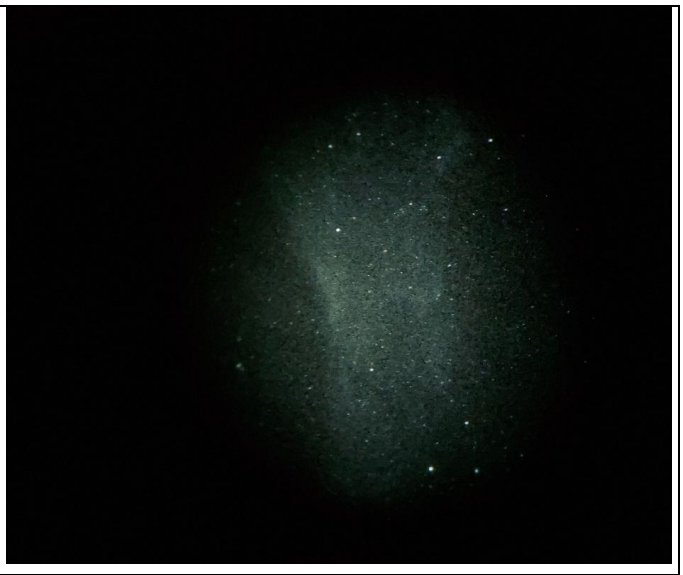
I recently bought a night vision device (PVS-14) for my 16-inch Orion Dobsonian. You can read the details about my setup on my website. I have been enjoying using it mostly for outreach and educational events. The other night, however, I had the opportunity to go out all by myself to do some exploring without the pressure of an audience.

I decided to try using my tube hand held. I used it with and without an H Alpha filter, and I could easily see M31 and M33 right next door. Encouraged by my success, I put the tube back into my telescope and was able to see M33 at lower power.

I continued to use my tube to scan the sky, finding a target hand held and then moving to the scope manually with the help of my Telrad finder scope. I enjoyed finding the California Nebula this way.



Andromeda Galaxy (M31)—0.5 sec handheld cellphone shot—see the dust lanes. Source: Corey Dallmeyer



Part of the California Nebula (NGC 1499)—looked really nice at 1x as well. Source: Corey Dallmeyer

I often use Stellarium to identify targets because I am still learning the nebulae. Unfortunately, sometimes I cannot fit the whole target into the field of view.

My first target of the night was the Horsehead and Flame nebulae. I had my 35mm Panoptic, which decreased the field of view, and I realized that I could use my 55/67mm special night vision eyepiece from TeleVue. Some nebulae were more stunning in photos than at the eyepiece.

*(**Continued on page 4)***

How to Join RAC

RAC—located in the Fredericksburg, Virginia, area—is dedicated to the advancement of public interest in, and knowledge of, the science of astronomy. Members share a common interest in astronomy and related fields, as well as a love of observing the night sky.

Membership is open to anyone interested in astronomy, regardless of his/her level of knowledge. Owning a telescope is not a requirement. All you need is a desire to expand your knowledge of astronomy. Most RAC members are from the Fredericksburg area, including, but not limited to, the City of Fredericksburg and the counties of Stafford, Spotsylvania, King George, and Orange. We also have several members who live outside Virginia and have joined to have the opportunity to use the Mark Slade Remote Observatory (MSRO)—one of the benefits of membership.

RAC offers you a great opportunity to learn more about the stars, get advice on equipment purchases, and participate in community events. We meet once a month and hold regular **star parties**. Our website, www.raclub.org is the best source of information on our events.

The StarGazer
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Website: www.raclub.org
Groups.io: Members-only group. When you join RAC, you will receive an invitation to join from the RAC President.

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Options for Dues Payment

RAC annual membership is $20 per family. Student membership is $7.50. You can pay your dues in two ways. (For reference, the RAC membership year is January–December.) If you join anytime in the last quarter, your membership covers the upcoming year. Astro League dues run July to June.

- **By Mail:** Make out a check to RAC Treasurer and send it to Matthew Scott, RAC Treasurer, PO Box 752, Fredericksburg, VA, 22404-0752. Both new and renewing members should also print out the membership application here, fill it out, and return it with their payment to keep our records up to date.
- ***By PayPal***: You can also pay your dues online. Simply go here, scroll down, and select the appropriate membership type from the dropdown box and click *Pay Now*. You do not need to complete an application because the notification the club receives of your payment will contain all the additional info needed. NOTE: If you pay using PayPal, your actual charge (including the PayPal usage fee) will be: Single/Family $21.23, Student $8.28, Single/Family & AL $29.00, Student & AL $16.05.

Upcoming Events*		Recent Events Completed	
Star Party, Caledon State Park	November 19	RAC Annual Picnic, Caledon State Park	September 3†
Star Party, Caledon State Park	December 17		
Star Party Caledon State Park	Date TBD**		

*Our Caledon star parties are public but please check our website for updates. Anyone can attend a RAC meeting via Zoom, just email president@raclub.org for an invitation.
**The schedule for 2023 star parties will be completed soon. Please check our website raclub.org for the new schedule, which will appear within the next month.
† RAC's *members-only* picnic. Event is usually followed by a star party open to the public, but the weather did not cooperate this year.

President's Corner

Dear Members—

RAC's business meetings are 8 o'clock on the third Wednesday of each month. Attendance has not been stellar. Please consider joining us and participating. If a presentation is scheduled, it will begin at 7 o'clock and will be announced in advance. If a presentation is not scheduled, I will host a social hour at 7 o'clock so members can chat and socialize before the meeting.

I send Zoom meeting invitations to all RAC members via RAC's Group.IO email list. Non-members may also participate by sending me a request at president@raclub.org. The invitation will specify the meeting time and if there is a presentation.

The club meetings are far more interesting when they begin with a presentation. Please consider giving a presentation on a topic or piece of astronomical equipment that interests you. Perhaps some of you can dust off and update a presentation you gave years ago that many of our new members haven't seen.

The annual election of club officers will take place during the November business meeting. Nominations for the four club officer positions opened in October, but you may still nominate someone before the elections are held. Please consider nominating someone or offering to serve as a club officer yourself. The more we contribute our time and talent, the better RAC will be able to serve its members and the community.

May God bless you with transparent skies and excellent seeing.

Glenn Faini
President

Did You Know? by Scott Busby

By November 1947, Ira S. Bowen the new director of the Mount Wilson and Mount Palomar Observatories, together with the members of the Observatory Council, judged the 200-inch mirror close enough to its correct figure to be sent from the optical shop on the Caltech campus to Palomar. There, Don O. Hendrix, the skilled young Mount Wilson optician who had taken over the work on the mirror, touched up its surface and aluminized it. Then it was put in the Hale telescope, and on December 21, Hendrix and Bowen made the first visual tests with it on stars, the "first light" for the 200-inch.

Source: *Walter Baade—A Life in Astrophysics,* Donald E. Osterbrock, Princeton University Press (Princeton), 2001.

This Can't Be Real—Night Vision Astronomy… *(Continued from page 1)*

Flame and horsehead,0.3 second handheld cellphone shot. Source: Corey Dallmeyer

These images are all less than 1 second of exposure—the limitations of my setup allow only a .3-second exposure; otherwise, the stars become significantly elongated. I am imaging with a handheld cellphone and a Go-To Dobsonian mount, which just does not allow for longer exposures without star trails.

However, I have found that the images are still beautiful, and I enjoy sharing them. None are edited in any way. I have been accused of faking or stealing the images or of not being fully transparent about my gear and exposure. I think that this reaction is because few astronomers are familiar with night vision astronomy. I didn't buy the night vision device for astrophotography—I could have spent the same amount of money and gotten a quite capable rig for that purpose. Instead, I purchased it for visual observing and outreach. The halfway decent photos are a nice side benefit that even inexperienced outreach participants can obtain with minimal effort. I wanted to share a bit of this facet of astronomy because I have found it very enjoyable, and it has made imaging much more accessible with limited astrophotography gear.

Here is another example: Barnard's Loop, an emission nebula in Orion, is part of the Orion molecular cloud complex that also contains the Horsehead and Orion nebulae. It is a large arc centered approximately on the Orion Nebula. The first time I tried to see this enchanting target, it was difficult to spot. I have an Orion 16XXG that does not allow me to see the whole target, but by using my PVS-14, I was able to see the whole nebula with an H Alpha filter and adapter that attaches to the tube. When I saw the target, I wanted to capture a picture but

was using the tube independent of the telescope. Holding the tube with my left hand, I held my phone to the tube and snapped the photo with my cell phone. This photo is not magnified and has a very short exposure time.

Barnard's Loop (Sh 2-276) at 1x, no telescope, handheld cellphone, handheld PVS-14, h alpha filter 0.3 sec shot. Source: Corey Dallmeyer

In this image I saw the bright spot to the left. I again hooked the PVS-14 up to the telescope, used Stellarium and my Telrad to find and identify the target, and sure enough, I saw the Rosette Nebula for the first time, and it all fit into my field of view.

Rosette Nebula (NGC 2244), 0.3 sec handheld cellphone shot, 55/67mm plossyl, h alpha 7nm

These images are a great way to show people what they can expect to see at an event. I host quite a few events in my small town, and the response has been wonderful. I see many people holding up their phones for pictures, and they are able to get the same quality images that I post on social media promoting the event. I like that I can deliver on my promise of incredible views with night vision astronomy. In addition, many of my events have led to schools contacting me to do events.

There are, of course, some drawbacks to using night vision technology in astronomy. With a night vision device, you will not achieve dark adapted vision because the device is too bright. Also, some people find that the scintillation is distracting or too much of a distortion to enjoy this type of observing, but this can be minimized by adjusting the gain.

Astronomy Math—The Next Level (TNL)

By Scott Busby

So, now would be a good time to review July's newsletter before jumping back into Newtonian gravitational theory, but….

Suppose, for instance, that planet-1 is circling Sun-1, and planet-2 is circling Sun-2. You can say that:

$$(M_1+m_1)\ P_1^2/(M_2+m_2)\ P_2^2=D_1^3/D_2^3 \qquad \text{(Eq. 8)}$$

where M_1 and M_2 are the masses of Sun-1 and Sun-2; where m_1, P_1, and D_1 are the mass, period, and distance of planet-1; and where m_2, P_2, and D_2; are the mass, period, and distance of planet-2.

To simplify these symbols, we can take it for granted that the planet is so much smaller than the Sun that its mass can be neglected. (This is not always true, but it is true in the solar systems.) In other words, we can eliminate m_1 and m_2 and write equation 8 as:

$$M_1P_1^2/M_2P_2^2=D_1^3/D_2^3 \qquad \text{(Eq. 9)}$$

Secondly, if we take the situation of the Earth revolving about the Sun as the norm and consider it to be the planet-2/Sun-2 system, we can measure all distances in astronomical units so that D_2^3 will equal 1. We will measure all periods of revolution in years so that P_2^2 will equal 1. Also, we will measure the mass of all Suns in terms of the mass of our own Sun taken as 1. That means that M_2, the mass of the Sun, is the equal to 1. Equation 9 becomes

$$MP^2=D^3 \qquad \text{(Eq. 10)}$$

where the symbols refer to the system other than the Earth/Sun system.

Suppose, for instance, that for the other Sun, we chose the Earth itself. (The Earth can serve as a central body around which smaller bodies, satellites, can revolve.) Suppose, further, that we wanted to calculate the period of revolution of a body circling the Earth at a mean distance of 237,000 miles. Because it is a period of revolution we are seeking, we'll rewrite Equation 10 as:

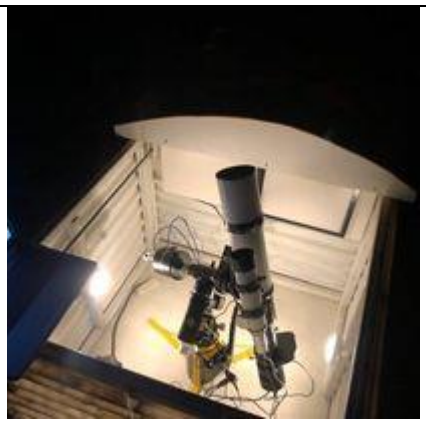
$$P=\sqrt{D^3/M} \qquad \text{(Eq. 11)}$$

In the January 2023 *StarGazer*, we'll revisit equation 11 and come to some conclusions. Happy star gazing!

MSRO Station 4 Nears Completion

By Myron Wasiuta, Director, Mark Slade Remote Observatory

As you read this, our Station 4 is in the final stages of construction which began more than 4 years ago! Consisting of an Explore Scientific 80mm f6 APO refractor on an I-exos 100 PMC-Eight mount and coupled with a scientific grade QHY 174 CMOS camera and five-position filter wheel, this station will be capable of doing "pretty picture" astrophotography, as well as scientific research in areas of photometry, spectroscopy, and astrometry. It is housed in a 36-inch L x 36-inch W x 30-inch H box with a roll-off roof. Inside on the wall is mounted a flat panel light box used for acquiring flat field calibration frames. The filter wheel has an opaque filter that is used to acquire bias and dark calibration frames. These features allow the observer to acquire needed calibration frames prior to opening the roof, resulting in the best possible scientific data and with maximum efficiency.



The station is powered by 120V AC, and a power strip inside the observatory distributes power to various devices such as the Beelink minicomputer, camera power supply, and PMC-Eight control box. Connectivity to the control computer can be via a network cable, USB with in-line repeater, or even Wi-Fi. The minicomputer is mounted on the pier and has all the telescope control, image processing, and star chart programs for observatory operation. It also has software installed that allows for remote control of the station from a remote computer (using Tight VNC). At this time, we are using Maxim DL Pro for camera operation, image acquisition, plate solving, focusing, and image processing. Telescope pointing and slewing is handled by Cartes du Ciel. Ascom POTH hub allows all these programs to communicate with the telescope.

The final stage of construction involves automating the roof so it can be opened and closed remotely. This is being done by MSRO member Mike Klosterman. I transported the station to his home in Culpeper a couple of weeks ago and when completed will return it to MSRO base in my backyard. Once I run it through some tests and it is deemed ready, it will be placed back in active service. At some point afterward, I would like to find it another location some distance from my home so we can take advantage of geographic differences in weather.

Some readers might be wondering how stable a telescope/observatory could be that does not have a pier built into the ground. I can state that once polar aligned, this station has been completely stable over 18 months sitting out in the elements. No changes to polar alignment were needed during that time. The only consideration is to make sure the station is staked into the ground to prevent it from being dislodged by strong winds. However, despite me not doing this, in the 18 months it was outdoors, it handled all the storms and snow that the weather challenged it with!

The version shown in the pictures is a prototype. If we ever decide to bring something like this to market, there would be further improvements in construction. Namely, the sides will not be corrugated roofing but instead ¼-inch smooth, flat PVC paneling. The roof would also be made of PVC sheets—much like our existing MSRO Station 2. There will also be provisions to deter theft such as locking roof clamps and anchor bolts. However, the station is light enough that it can be easily moved by two people, allowing repositioning in the yard or at other locations (perhaps such as star parties!).

The photos below are samples of what can be achieved using the Station 4 system. If anyone would like more information on this station, or MSRO in general, please feel free to contact me.

M81/82

M51

Megatsunami Triggered by Impact of Extinction Asteroid?

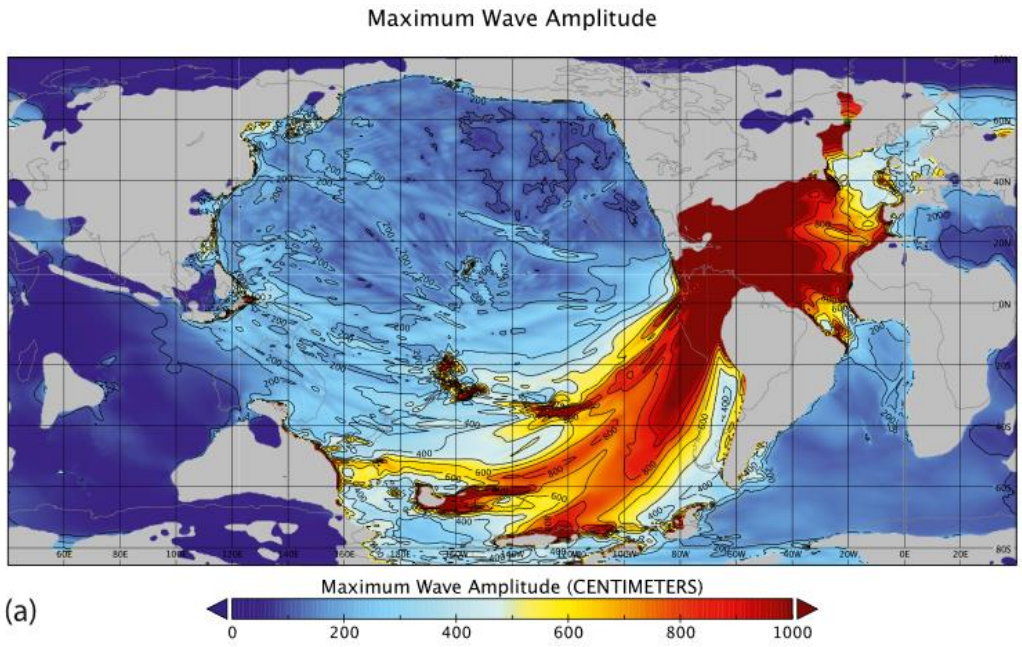
By Linda Billard

When the Chicxulub asteroid struck Earth about 60 million years ago, it did more than make a big dent. As you may know, most scientists believe that this collision created the conditions that killed the dinosaurs and ended the Cretaceous period. If you read this newsletter regularly (and I hope you do), perhaps you remember an article in the April 2019 issue (page 10) that reported some archaeological research in, of all places, North Dakota (not exact next door to Mexico).

Artist's rendering of Chicxulub asteroid impact. Source: NASA

Excavating in the Hell Creek Formation in North Dakota at a site he later christened "Tanis," Robert De Palma found millions of microtektites relatively near the surface. These small glass droplets are produced when an asteroid strikes the Earth, causing molten rock to shoot up and then rain back in solid form. As a result of his surveying and mapping, De Palma initially hypothesized that a huge surge of water from the inland sea flooded this low-lying area, perhaps as part of a tsunami that occurred immediately after the asteroid impact. Subsequently, however, he became convinced that a series of seiches—repeated sloshing of bodies of water that occurs at the same time as earthquake tremors—brought the material to the Tanis location.

Recently, further support for De Palma's initial tsunami theory appeared in a study, published in *AGU Advances*. Dr. Molly Range (University of Michigan) and her colleagues describe how they reconstructed the asteroid's impact and the first 10 minutes following that cataclysm. Using their model, they were able to see the effects, which included a global "megatsunami" that produced flooding around the world. As shown in the map below, the researchers' simulation indicates extreme wave heights over most of North America (including what is now North Dakota).



Model of Maximum Wave Amplitude from Impact of Chicxulub Asteroid. Source: "The Chicxulub Impact Produced a Powerful Global Tsunami," by Molly M. Range et al. in *AGU Advances* (June 2022).

In an interview with the *Washington Post*, Dr. Range compared the asteroid strike and its results with the Sumatra Tsunami that followed a magnitude 9.2 earthquake in 2004. At least 200,000 people died. However, in comparison, the Chicxulub megatsunami had 30,000 times more energy, Range said.

Range's team simulated the tsunami using a 3D computer program called a hydrocode. Hydrocode programs work by digitally breaking a fluid system into a series of small blocks and then calculating forces acting on it in three dimensions. The results were fed to two NOAA models that simulate the progress of tsunamis through the oceans.

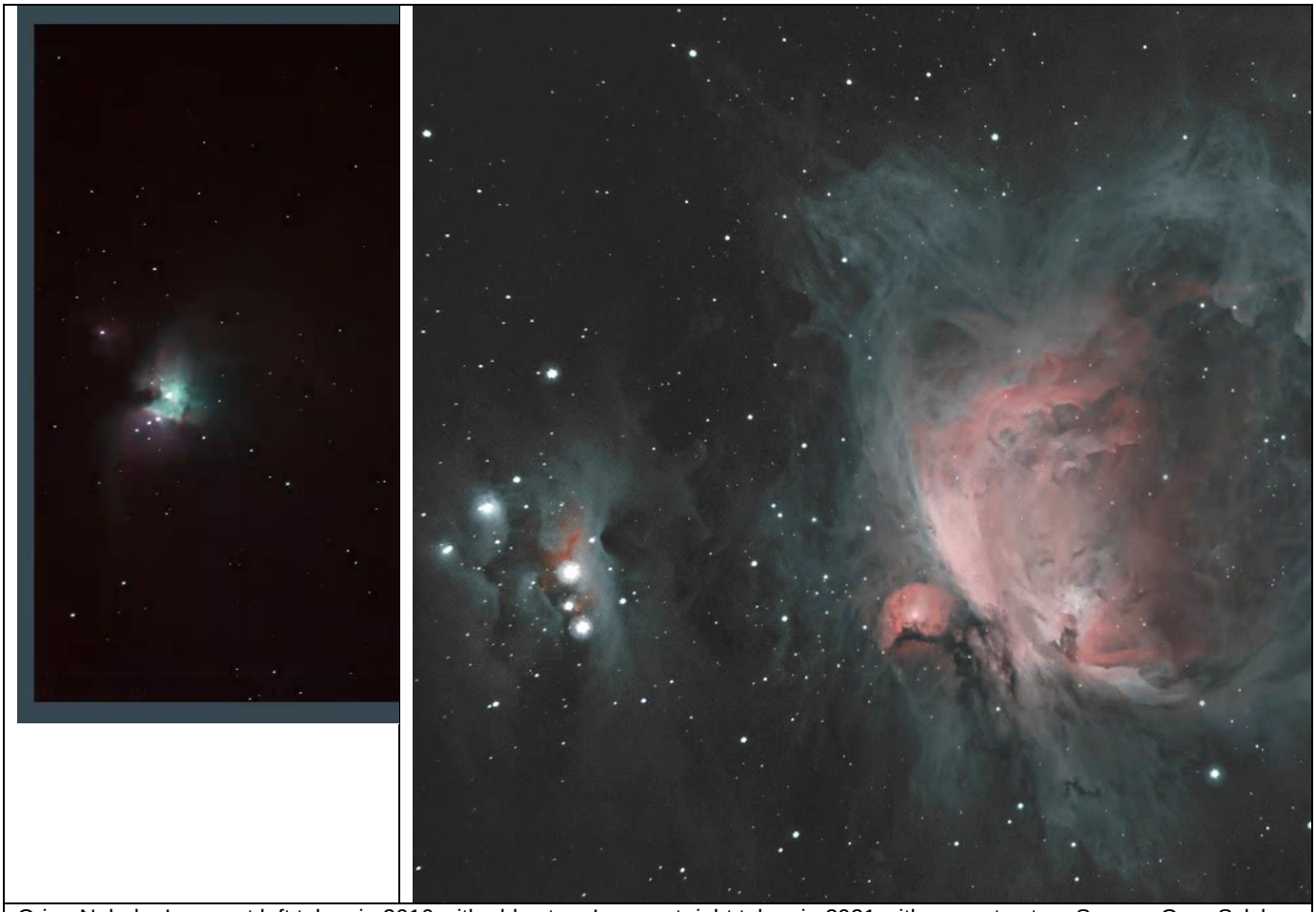
The Range team also did some preliminary work to estimate the effects on shorelines and plan to pursue estimates of the level of flooding that would have occurred.

Highlights of Recent RAClub Presentations

Abstracted from Bart Billard's Meeting Minutes

October 2022—Basic Astrophotography & Image Processing

Greg Szlyk introduced his presentation by saying he had done visual observing as a child and got started again in 2016 using a DSLR with a vintage Celestron C8. He built a telescope pier in 2020 and then upgraded his OTA and camera in 2021. Lately, he has focused on nebulae and deep-space objects. He said his goal was to make print-worthy images he could share with family and friends.



Orion Nebula. Image at left taken in 2016 with old setup. Image at right taken in 2021 with current setup. Source: Greg Szlyk

Greg began by showing his first Orion Nebula image taken in 2016 as a one-shot color 30-second exposure. It was a small image but showed nice color contrasts. His most recent version, made with his Explore Scientific 102-mm triplet refractor and a QHY268 color CMOS camera filled the image with colorful details. He said a lot had changed with how he processed his images, and he would describe his current techniques using his North America Nebula image. *[Editor's note: Greg's final version—after applying this process—appears as the Picture of the Quarter on the last page of this newsletter.]*

Beginning with the rules he followed, Greg said his first rule was to work within the data. The exception he mentioned was sometimes adding artificial diffraction spikes to some star—sometimes they added interest or looked cool. He noted you could tell they were added because his telescope was an apochromatic refractor that could not produce them. Otherwise, he stuck with enhancements that worked with what was in the image, just "stretching, and curves, and processing, and smoothing." His other rule was "have fun." Being able to share with family and friends has kept him motivated.

Greg showed some images that illustrated his learning process. He had some planetary images made in 2016–2017 when he used the DSLR, although he said he tended not to do much planetary imaging because of his current setup. He was interested in checking out the astrosurface.com link that Scott Busby sent out during the week and thought he might spend some money to try some video capture on planetary targets. He showed some 2017 Whirlpool Galaxy images made with the DSLR and C8. He said he did not know enough about stacking at that time so he said the detail was not as good as it could be. He indicated his 2020 Orion Nebula image showed he was still struggling with how to handle the broad range of intensities. It wasn't until he learned how to use layering that he was able to get the Trapezium in the middle not to be so overexposed. A few more nebulae and galaxy photos took him up to this year's North America Nebula image. He started with a version from the first

night's data that he had sent out recently and said he would illustrate how he worked toward the final image incorporating several more nights of data.

Greg's "Gear" slide listed his hardware and software. He currently had an Explore Scientific 102-mm Triplet with a QHY 268 OSC CMOS camera. He currently used an Optolong L-extreme Narrowband filter transmitting Hα and OIII with 7-nm bandwidth, and said he recommended it highly for bringing out detail in nebulae even with some moonlight or light pollution. He also had a 50-mm Orion guide scope with a Starlight autoguider, and his telescope was on a Celestron Advanced VX mount attached to a pier. A Pegasus Powercube and USB Hub let him control everything from his laptop in the kitchen. For software he had the Celestron CPWI for telescope mount control, the Pegasus software for the power/dew heaters, PHD II for autoguiding, and the QHY camera controller interfaced with NINA software for image sequencing. He was using ASTAP for stacking and Photoshop for processing. In Photoshop he used two tools: Gradient Exterminator and Annie's Astro Actions, which he called a package of prefabricated "astronomy processing playbooks." He said they act like widgets inside Photoshop and let you do things such as make stars smaller, reduce graininess, or enhance deep-sky objects.

Greg introduced a discussion and demonstration of his processing of the North America Nebula with a preview of the initial stacked image that looked almost black with a few stars as well as the final image he would end up with. The stacked image at the start of processing was a 16-bit TIFF straight out of ASTAP and unstretched. Continuing this introduction, an image of his initial stretch showed a faint nebula and some more stars. He said he was just trying to "get inside the data a little bit" by starting to build up his curves and histograms, wanting to avoid losing any detail by being careful with his stretching and levels. He said it was important to learn how to adjust gain and offset to control the image histogram shape and position when capturing your initial pictures. His next images showed effects of a levels adjustment to bring out the brightness after the stretching and then use of the Gradient Exterminator to get rid of the artificial-looking redness and gradient that obscured the textures of the nebulosity. His final processing was basically smoothing and a little contrast enhancement.

For a live walkthrough of this processing, Greg switched his screen from slides to Photoshop and offered a chance for questions. Glenn Faini asked whether it was the full-blown version of Photoshop, which Greg confirmed. He started with the image he had posted the week before, which was a stack of images comprising 50 minutes of exposure time (50 1-minute subs). He zoomed in and out of various areas in the image to show the level of detail that that amount of data could provide. Then he showed the initial stack from ASTAP and the finished product for data totaling 160 minutes of exposure, again zooming in and out to show how much more detail that amount of data could provide.

Greg began describing how he used Photoshop—from the initial stack of the full data to the final image he had just shown. He said first he made sure not to lose any data in each of the steps or "layers" he made by using a non-destructive process/workflow. Each layer had all the data in his original stack and could be reversed. He showed the histogram that could be displayed in the area where the Photoshop controls were available, and another that he popped up in its own window where all three colors could be seen. His first step was to adjust the level. He pointed out all his data were concentrated on the left side of the histogram, indicating those pixels collected less light than the ones farther to the right. To the right of the rounded high peak on the left, the curve dropped back to the horizontal axis and diminished to broken lines and individual dots, with nothing beyond about 3/4 of the way to the right edge. Greg showed how he used this for the first step of level adjustment, by choosing the appropriate control that let him move a triangular slider from the right end of the horizontal axis left to stop just to the right of the end of the scattered dots representing some of his data. Next, he chose the control that displayed a curved line superimposed on the histogram that started at the bottom left and ended at the top right. He could click and drag spots on this line to stretch or bend the curve to change its slope in a chosen area. He straightened it to show how it started (it also appeared to show he could reverse this step if he needed to), and then showed how he could increase the slope where the histogram peaked. One spot let him stretch the curve downward near the left edge of the histogram peak where it started the upward curve, and another let him stretch it upward near the right edge of the peak area, resulting in in increased slope of the curve in between. He pointed out that a modest adjustment noticeably brought out more detail, which was all he needed to do at this stage.

Greg said the next step was to save that data and then repeat the same two steps, doing a little more stretching and increasing the curve slope a little more. In the second stretch step, he mostly used a second triangular slider near the right edge of the peak that he had barely touched the previous time. In the second curve step, he just did slightly more bending to increase the slope of the curve between the sides of the peak. Afterward, he noted the image was looking fairly good, and one might be inclined to stop. However, he pointed out a red glaze was visible

over most of the nebula, and said it was obscuring more detail. He used Gradient Exterminator to tone down the redness and indeed brought out more detail.

After using Gradient Exterminator, Greg said another pair of level and curve adjustments were needed. He mentioned the green channel tended to be noisy in astrophotography, and some people even throw it away, but he did not do that with this image. What he did was make the level adjustment by color channel to make the histograms look more balanced. At that point, he was ready to focus on the quality of the noise in the image. He zoomed in on an area and pointed out a sort of blotchiness, saying here was where he would go to the tools in Annie's Astro Actions. When he brought it up, it showed a drop-down list from the toolbar of a large number of actions. He pointed out you could remove the green channel and synthesize one, for example. The actions also appeared with buttons in the control area of Photoshop where he could select and use them. He used one to remove some of the fuzz and another to reduce some of the larger stars. Another called "Enhance DSO" brightened the image and helped bring out some of the contrast areas. He also did a local contrast enhancement and some noise reduction. He said that individually the effects were fairly subtle, but together they made a significant difference. He said that if one seemed too robust, Photoshop would allow you tone it down by reducing the opacity of that layer. He mentioned using some other small adjustments, including a local contrast and brightness enhancement to bring out the great wall and adding small diffraction spikes to some "blown out" stars.

After Greg concluded the walkthrough, he asked for questions. Glenn F. asked him to clarify whether each step was built in a different layer, and he confirmed that is how Photoshop works. He said it was good to have those layers because if you messed something up you could just go back and erase that layer. In response to a question from Myron about using the L-extreme filter with a one-shot color camera, Greg said his one-shot color camera pairs well with the filter. Myron also asked about connecting with his equipment. Greg said he runs a wire out from his kitchen each session, having been unable to get reliable WI-FI connectivity. He had found a 30-foot-long USB cable that has a repeater in the middle. (Later he emailed a link for the cable via our Groups.io list, along with some other links to items that came up.) They also discussed using Cat 5 ethernet cable and a hub that converts from ethernet to USB to cover longer distances. Greg showed the Astronomy Tools website with a suitability calculator that helped him choose a telescope and camera that matched well. He showed its results for his camera and telescope, with and without a 0.7x focal reducer. He said it could tell you if you would over- or under-sample and get bloated or square, boxy stars. Depending on seeing conditions, you could also see when you might need a focal reducer.

Greg then went over a list of the biggest tips he had learned along the way. First was to pay attention to your histograms. Make sure most of your data is in the left one-quarter to one-third of the graph and adjust your gain and offset to match the subject. He said more offset was needed if the histogram is squished too much against the left edge, and if the peak is too narrow, increased gain is needed. He advocated refocusing frequently (temperatures change) and using an autoguider. He thought using the tool he showed to pair his camera and telescope wisely was important. He also felt using non-destructive processing was a good practice. He made a case for sticking with what works for you, saying he found he was better off going back to Photoshop after trying another app for a while. Finally, he said to have fun so you keep working at improving. Greg has a website called the Rappahannock Area Deep Space Observatory where he has a small gallery of images.

Brian Barbre said he had also been working on the Pac Man Nebula and asked whether Greg also used the L-extreme filter, which Greg confirmed. He could not remember for sure but believed it was on the Explore Scientific telescope. Myron asked whether he used bias and flats as well as darks. Greg said he mostly used just darks and thought that with the Gradient Exterminator, he did not need flats as much. He sometimes used bias images and showed the Orion Nebula image as an example. Myron admired the three-dimensional effect of looking into a hollowed-out region it had with the surrounding dust clouds brought out. Glenn asked him about the prints he had seen in Greg's office and how he got such good reproduction of the depth in the images. Greg said they were acrylic prints he found on Amazon and were relatively inexpensive. He recommended brightening the image for the file to be sent for printing because they tend to come out darker than they appear on the monitor. "Make them a little bit obnoxious when you get them ready." *[Editor's Note: To a view a video of this presentation, visit our website here and scroll to the bottom of the page and click the link.]*

Image of the Quarter: North America Nebula

By Greg Szlyk

NGC 7000 looks like a continent—North America to be exact. It is located near Deneb in the tail of Cygnus. Discovered by William Herschel and cataloged by his son, John, it was first photographed by German astronomer Max Wolf in 1890. Wolf is responsible for the name North America Nebula. NGC 7000 is part of a larger complex that includes the Pelican Nebula (IC 5070) and the swath of dark dust that separates the two.

This image is Greg's final version after applying the process he described in his October 19 presentation. He said of the imaging session on October 14, 2022: "I took advantage of clear skies last night. First looked at NGC 7000. I hope to collect more data on this target over the next month. This is just 50 min of usable subs, but overall. a pretty good start. This was the Explore Scientific 102 paired with the QHY 268 OSC. L-xtreme filter. 60 sec subs x 55. PHD guiding. Sequence in NINA. Stacked in ASTAP, processed in Photoshop. Basic stretching, Annie's Astro Actions, Gradient Exterminator, and camera RAW filters."