Rappahannock Astronomy Club

Minutes, October 19, 2022, Online Meeting

In attendance:

Brian Barbre
Scott Busby, Equipment Manager
Bart Billard, Secretary
Linda Billard, *StarGazer* Editor
Corey Dallmeyer
Glenn Faini, President
Claire Gardener
Glenn Holliday
Mark McDonagh
Troy Major
John Maynard, Web Administrator
Mike Parker
Gregory Szlyk
Christy Townsend
Myron Wasiuta, Vice President

The meeting began with a presentation at 7:00 followed by a few minutes of free discussion before the business meeting at 8:00. Fourteen members and a guest attended.

Program

Greg Szlyk presented "Basic Astrophotography & Image Processing." He told us he had done visual observing as a child and got started in 2016 using a DSLR with a vintage Celestron C8. What he could see with sensors became his passion, and 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 print-worthy images he could share with family and friends.

Greg started 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 in how he processed his images, and he would go through his current techniques in this presentation, using as the example the North America Nebula image he had recently sent out.

Beginning with the rules he followed, Greg said his first rule was to work within the data. The exception he mentioned was occasionally adding artificial diffraction spikes to some stars. They sometimes added interest or looked cool. He noted you could tell they were added because his telescope was an apochromatic refractor that did 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 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 did not now tend 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 the time so he said the detail was not as good as it could have been. He indicated his 2020 Orion Nebula image showed he was still struggling with how to handle the large 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 had started with a 1970s Celestron C8 and 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. Greg 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 acted 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 and 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. trying 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 at various places in the image to show the level of detail that that amount of data could provide. Then he showed a comparison of the initial stack out of 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 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 still had all the data in his original stack and could be reversed. He showed the histogram that could be displayed in the area to the right of the image 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 that all his data was 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 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 on spots on this line that let him 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), then showed how he could increase the slope somewhat in the area where the histogram peaked. One spot let him stretch the curve downward near the left edge of the histogram peak area 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 brought out noticeably more detail and said that 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 the second triangular slider near the right edge of the peak this time, 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 sort of red glaze was visible over most of the nebula, and said it was obscuring more detail. He demonstrated use of Gradient Exterminator, which toned 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 in 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 large number of possible 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 thought individually the effects were fairly subtle, but together they made a significant difference. He said 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 use of 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 sort of 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 are 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 was 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 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 he used the Explore Scientific telescope. Myron asked whether he used biases and flats as well as darks. Greg said he mostly just used 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 F. asked him about the prints he had seen in Greg's office and how he got such good reproduction the depth of 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."

Old Business

- President's Report—Glenn F. just had a question he wanted to bring up about the method for sending out the invitations to our online meetings. He said we had decided to have him send them out via blind cc emails. It was a way to limit access when our previous group was more open, but now we restrict access to our Groups.io list. Glenn noted occasionally a member loses his email invitation and has to ask him to resend. If it is sent via our list, a member can log in to Groups.io and find the invitation, so he wanted our opinion on sending the meeting link via our list instead. The members present seemed to be agreeable. Glenn said he would need to send an

email to members who have not joined the group to let them know they should join the group list to get the meeting invitations in the future.

- Treasurer's Report— Glenn F. said there were no incoming funds in September, and the only expenditure was $56.62 for club picnic expenses.
- Vice President's Report—Glenn F. said the last star party was cancelled because of weather, and he and Myron concluded Myron had nothing else to report. Glenn said the next star party was scheduled for October 22, the Saturday following this meeting. He said he would be in North Carolina and would not be able to attend and support the star party, but he could still make the go/no go call. Troy Major volunteered to be there when Glenn asked for someone who could support it.
- Secretary's Report—Bart Billard said he had just posted the minutes and otherwise had nothing to report.
- *StarGazer* Report—Linda Billard said she was working on the next issue that was due out on November 1. Material for the next *StarGazer* was looking lean this time. She had a contribution coming from Scott Busby and a couple of articles she was working herself, but she was looking for more contributions. She suggested contributions could simply be a small thing like a piece of equipment you like or don't like. Glenn F. asked Corey whether he could do something. He agreed and talked with Linda about some of the details and when she would need it.
- MSRO Report—Myron said MSRO Stations 2 and 3 were fully operational, but Station 1 had technical problems with Internet power switching. It could be used over the Internet, but Myron had to go out and turn on the camera and Telescope Drive Master manually. To be realistic, he suggested we should just consider stations 2 and 3 available to the club until he could get a replacement installed for the switch, which would make it fully operational. Station 2 was the 10-inch RC telescope. Myron recalled Greg talking about focus shift and said one nice thing about the RC was the quartz primary and secondary mirrors that were hardly affected by temperature variations during a long astrophotography session. He said Station 3 was the 102-mm ES apo refractor with a one-shot color camera. It was probably the one to use for training sessions, and it had autoguiding so users could learn about that as well. Myron said Station 4 was an 80-mm ES refractor on an ES IXOS100 mount. It used a scientific-grade CMOS camera with a filter wheel. He said it was currently off line because he took it to Culpepper for Mike Klosterman to complete the setup of the motorized roof so we could operate it remotely over the Internet. The enclosure had a light box installed and the filter wheel had an opaque filter in one slot so user would be able to get flats, darks, and bias frames all before even opening the roof. Myron added that MSRO was working with another high-school student, a junior, who would be working on a variable star project observing cataclysmic variables, which are binary systems involving white dwarfs paired with larger evolved stars undergoing mass transfer to the white dwarf. They would try to observe a type called a "micro nova," such as EI Ursae Majoris, in which the white dwarf member has a very-high magnetic field that concentrates accretion of material from the companion star near the magnetic poles, causing differences in the way they erupt and their spectra and light curves.
- Communications Committee Report—John Maynard had nothing new to report. Glenn F. said he had nothing to report about our Groups.io other than the decision earlier in the meeting to go that route for sending future Zoom meeting invitations to members.
- Equipment Inventory Report—Scott Busby reported an acquisition of a Celestron NexStar SE donated by someone who purchased it as a gift for his wife that wound up only being used once and put away in the box. It included a bundle of extras from Celestron, like a power pack. He said he had been too busy to check it out, but Rolando Pancotti was interested in purchasing one and was willing to check it out and give Scott a report.

New Business

- Upcoming Events—Glenn F. reported that Holy Cross Academy sixth graders were interested in attending a star party in October, but the first one was cancelled because of the weather from Hurricane Ian. He expected they would go to the star party scheduled for Saturday after this meeting, weather permitting. He said the next item was the Chancellor Elementary School Moon night on November 2 and invited Christy Townsend to talk about what they were looking for. She described some learning stations they were setting up inside and added they had a few small telescopes but were hoping some club members could take some of their equipment for a wider variety. She said the students were told to come from 6:30 to 8:00 in the evening, but club

members could arrive earlier for setup. Glenn also brought up a request from one of the people from Caledon who now worked for Fredericksburg State Parks and was interested in a star party event on December 13 at Old Mill Park or Dixon Park. Corey said he had talked to her and was going.

- 2023 Star Party Dates—Glenn F. said he sent out a PDF with proposed dates showing dates of the new Moons. He said he would like to have these dates posted on our website, adding that if he heard back from Caledon about any conflicts, we could make the appropriate changes. When he asked about who would do that, John said he had been putting them in the calendar. Finally, Glenn said he had not indicated the date of the club picnic on the proposed calendar of star parties, but that it would be on September 23 if that date was OK with Caledon.
- Nominations for Club Officers—Glenn F. said nominations for club officers was the only item left for this meeting. He said nominations were now open for the four positions of President, Vice President, Treasurer, and Secretary, and elections would be held in November. He asked members who would like to nominate a candidate (or themselves) for any of the offices to do so, and also asked current officers who did not wish to run for another term to let him know. He said Matt Scott had indicated he was willing to continue as Treasurer. Myron said he was willing to run for Vice President, and Bart said he would be willing to continue as Secretary. Glenn said he thought that after 4 years of his Presidency it would likely be good for the club to have a change, but he was willing to run for another term if no one volunteered. Glenn and Myron suggested Corey consider running for vice president because of the amount of outreach he was doing. Corey said he would consider it but had an outreach and an expected baby in the next few days. Glenn asked whether anyone else had any ideas for members who might want to run for office. When he got no replies, he said he would close nominations for this meeting. He added our bylaws say that persons nominated have to accept the nomination before they are voted on at the November meeting. He asked whether anyone had any other new business before thanking Greg for his presentation and saying when the recording of the meeting was available, he would prepare the presentation part for posting on our website. There was no other business suggested, and he adjourned the meeting.

Next Meeting

The next meeting is on Wednesday, November 16, 2022, at 8:00 p.m. It is planned as an online meeting.