



Event Horizon

Volume 28, Number 2
December 2020



From The Editor

The year 2020 has been quite a year indeed.

There has been little in-person social interaction by anybody for obvious reasons.

But it's been a banner year for astronomical events in the sky!

Happy Holidays everyone, stay safe, and continued Clear Skies!

Bob Christmas, Editor

editor 'AT'
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Chair's Report by John Gauvreau

As our wonderful observing director will tell you, as this month ends so too does planet season, as we bid farewell to Jupiter and Saturn (in spectacular fashion). It seems a fitting way to finish this most extraordinary year.

Yet, for all the sorrow and strangeness that this year has brought, I must point out that it didn't stop us from finding a way to get together. We were back up and running our monthly members meetings online (after only a brief interruption) and they are working really well. We got back out observing, and found that the same camaraderie we were used to can still be enjoyed from an appropriate distance. Our calendar did not miss a beat and the 2021 edition is out in members' hands already!

On a personal note, even though my wife and I missed out on attending a family wedding but did have to endure a family funeral (the kind of story that was all too common this year), we look forward to the arrival of a new grandchild before the year is out (he's not here yet, but should be any day now!). The point being that for all the bad, there has been plenty of good. Here's some of the good I experienced under the night sky; I enjoyed some wonderful observing this year, not the least of which was a spectacular

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Chair's Report (continued)

comet. Mars was amazing. I made it out to some very dark skies and enjoyed some truly remarkable sights there. I came home with what I think are a couple of my best ever astrophotos (although the image of mine that made it into the calendar was a shot of the Orion nebula taken from Binbrook!). I had my best ever view of Mare Orientale on the Moon. I added a very low end solar scope to my observing gear and have used it a lot (I can't recall any other piece of equipment that I have used so much so quickly. I love it!). And most remarkable and best of all, I have gotten to know some of the new members in the club, even under these challenging circumstances. So, you know, not such a bad year in some ways.

HAA Meetings

All our meetings will be held online through the Zoom platform for the foreseeable future. This is a very easy format to use and if you have had any hesitation about joining in, please feel free to get in touch and we will help you. The meetings are fun and interesting, and as a bonus we are able to enjoy speakers from farther afield.

I want to thank everyone who participated in last month's meeting. This was the first time we had so many astrophotographers and artists participate in a single presentation and I loved it! It was so great to hear all the little behind-the-scenes stories from the photographers themselves. Thank you to everyone who made last month so great!

This month, *Dr. Yanqin Wu* from the University of Toronto will be speaking to us about extrasolar planets he has been studying, using Kepler satellite data. Don't miss out on this exciting presentation!

A friendly reminder that since we are holding our meetings online, there is no collection for the foodbank, but don't let that stop you from contributing yourself. It doesn't matter if it comes from the club or straight from the club members; there are people in need and any donation is always welcome.

The December meeting begins at the usual time of 7:30pm on December 11th. This month we have some very special door prizes as an added enticement! Hope to 'see you there'!

Membership

This is the time of year when we renew our memberships. We are still the least expensive and most active club in the area and members like you are what make the club so great. If you haven't already, you can join through our PayPal link on our website or even mail in a cheque (but doing it online is really easy!). If you have already renewed; thank you! If you are a new member who has just joined us recently, be welcome! We are glad to have you here for the upcoming year. And if you are a member who still needs to renew, I hope you will do so. I always say that it is getting to know all the good people here that makes membership in the club worthwhile.

Beginners Group

The Beginners Group is back! Each year, the HAA offers a series of seminars for absolute beginners (you might have signed up for the 2020 session but of course all meeting were suspended in March, just when we were about to begin). This year, the Beginners Group meetings will be online. The group meetings are informal and interactive. It's a relaxed and fun environment.

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Masthead Photo: *The Veil Nebula, Western Portion (NGC 6960), by Mike Hamilton.*

Taken in November from Waterdown, ON. Equipment: ES102ED, ZWO294MC Pro, EQ6R-PRO.
Total exposure time: 4.5 hours.

Chair's Report (continued)

Is this for you? During the meetings or out observing you might hear people talking about different kinds of telescopes, galaxies and nebulae, but what are they? Do you not yet know which end of the scope to look through? Maybe the jargon is all just a bit too much! Are you new to astronomy and just need to know where to start? Then this is the group for you!

Originally designed to familiarize newcomers to the club with the basic workings of telescopes so they could take advantage of the club's telescope loaner program, the Beginners Group (affectionately known around the club as Astro 101) has evolved to include not only telescope basics but also astronomical vernacular, a tour of what's up there in the sky to look at and available resources to help you move forward as you explore the hobby. And best of all, it's a chance to meet (online) other beginners and some experienced members. It's a great way to get familiar and comfortable with the club and the great hobby of astronomy.

If this sounds like it's for you then please feel free to sign up. You can get in touch with me directly to do that.

Social Media

Did you know that the HAA is very active on social media? Hit 'Like' on our Facebook page, follow us on Twitter and subscribe to our YouTube channel. If we can get a hundred followers on YouTube, we can get a proper name for the channel. That will make promoting the great content on there much easier. Here's the link (please subscribe!):

[Hamilton Amateur Astronomers - YouTube](#)

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HAA Helps Hamilton

While during the pandemic, the H.A.A. hasn't been able to collect donations from our members and guests for local food banks at our general meetings, the H.A.A. has always valued its relationships with food banks in the community, particularly [Hamilton Food Share](#).

In that spirit, we encourage you to continue making donations directly to your local food banks.



Chair's Report (continued)

HAA 2021 Calendar

The calendar is done (I can hear editor Doug Turner breathing a big sigh of relief!). In fact, you may already be the proud owner of a copy or two. The club had 150 copies printed in the first printing run and they are all sold and in members hands. I couldn't have been prouder than I was at the last meeting showing off the wonderful efforts of so many members, including the photographers, artists, helpers and editor. I believe this was the 13th edition of the calendar that the club has produced and it just gets better every year.

HAA Council

This past month saw the appointment of the councillors at large. Sadly, this year sees Gary Sutton step down after many years on council. Gary is taking some well-deserved personal time and we wish him the very best. The rest of the councillors at large have stayed aboard. Steve Germann, Mike Jefferson, Sue MacLachlan, Dee Rowan, Barry Sherman, Bernie Venasse and Melissa Whitman are all familiar names to you, and I am delighted to welcome them back.

Joining council this year is Swapna Shrivastava. Swapna and her family are enthusiastic amateur astronomers and I am not only delighted that they have become active members of the club, I am also particularly delighted to welcome Swapna to council. She has already proven to be a valuable addition to the team.

Conclusion

And so the year draws to a close in a manner so different from how it began. Yet, the HAA has adapted and as we move forward into 2021 I look forward to another great year for the club and I look forward to the chance to see you all again.

Please take care of yourselves and stay safe. Feel free to get in touch and hopefully I'll see you at the online meeting. And of course, however you celebrate and observe the season, my very best wishes to you all though these shortest days, longest nights, and the coming of a new year.

Coming in January: HAA Explorers!

A new section in the HAA Monthly Newsletter for our younger astronomers featuring information, activities and fun!

Can't wait to see you then, and in the meantime:

What is the biggest "waist" of space??

Happy Holidays Everyone

Answer: Orion's belt!



The Sky This Month for December 2020 by Matthew Mannering

I have been fortunate enough to be able to get out to our dark sky site a couple of times in November. In both cases I spent a good part of the evening observing *Mars*. Mars is well past opposition now and is about 30% smaller than it was in mid-October. The first evening was on November 15th and Syrtis Major was clearly visible. I was able to quickly identify it and suggested to the other members out that night to take the time to view it. Syrtis Major is easy to pick out on the disk of Mars as it looks a lot like India. I then put a red filter on my eyepiece and was able to see the southern polar cap which was much smaller than it was a couple of months ago. Hellas basin was also visible between the cap and Syrtis Major.



Mars.

*Image Credit: Stev aka yock 1960 on
CloudyNights.com*

My next chance to observe was last night on November 28th. I was supposed to be getting this article written, but Bob had to wait so I could get some viewing in! I decided to try using a filter that increases contrast and reduces glare by removing light pollution. It was my first use of my *Baader UHC-S* filter on a planet and it made a big difference! Mars took on a nice pale Salmon colour and the darker areas on the surface were more pronounced. The other thing I noticed right away was the Northern Polar Hood which was a beautiful deep blue. As the southern polar cap diminishes, these blue clouds become more prominent. This is the first time I have ever seen the Polar Hood and the filter made it possible.

Next, I decided to try the same filter on the *Moon*. Normally the full Moon is flat looking with minimal detail and so bright that it is hard to view. The filter made the Moon much more interesting by cutting down the brightness and making the small craters and ray systems really stand out. It's the best view of the full Moon I have ever had.

December brings the *Geminid Meteor Shower* which reaches its peak on the morning of the 14th. This is considered one of the better meteor showers of the year with a peak rate approaching

150 per hour. This year, the shower occurs at New Moon, which means fainter meteors are possible to discern. You can start viewing the shower late on the 13th but as usual the best part of the show will be after midnight. As always, you should allow time to become dark adapted and try to find a dark location to observe from.

December also has the most anticipated event of 2020. From December 12th through the end of the year, Jupiter and Saturn will be less than one degree apart in the evening sky. On December 21st Saturn and Jupiter will be at their closest - only six arc minutes (one tenth of a degree) apart. This is the closest conjunction of these two planets since 1623. You will need to pick them out in the evening twilight as they set about two hours after the sunset at approximately 4:50pm. If possible, find an elevated viewing location with a clear view of the western horizon. You can use moderate magnification and still be able to see both planets and their moons in the field of view!

At the November general meeting via Zoom, I presented John Gauvreau's image of the western limb of the Moon. John took his image to try and capture the crater Mare Oriental.

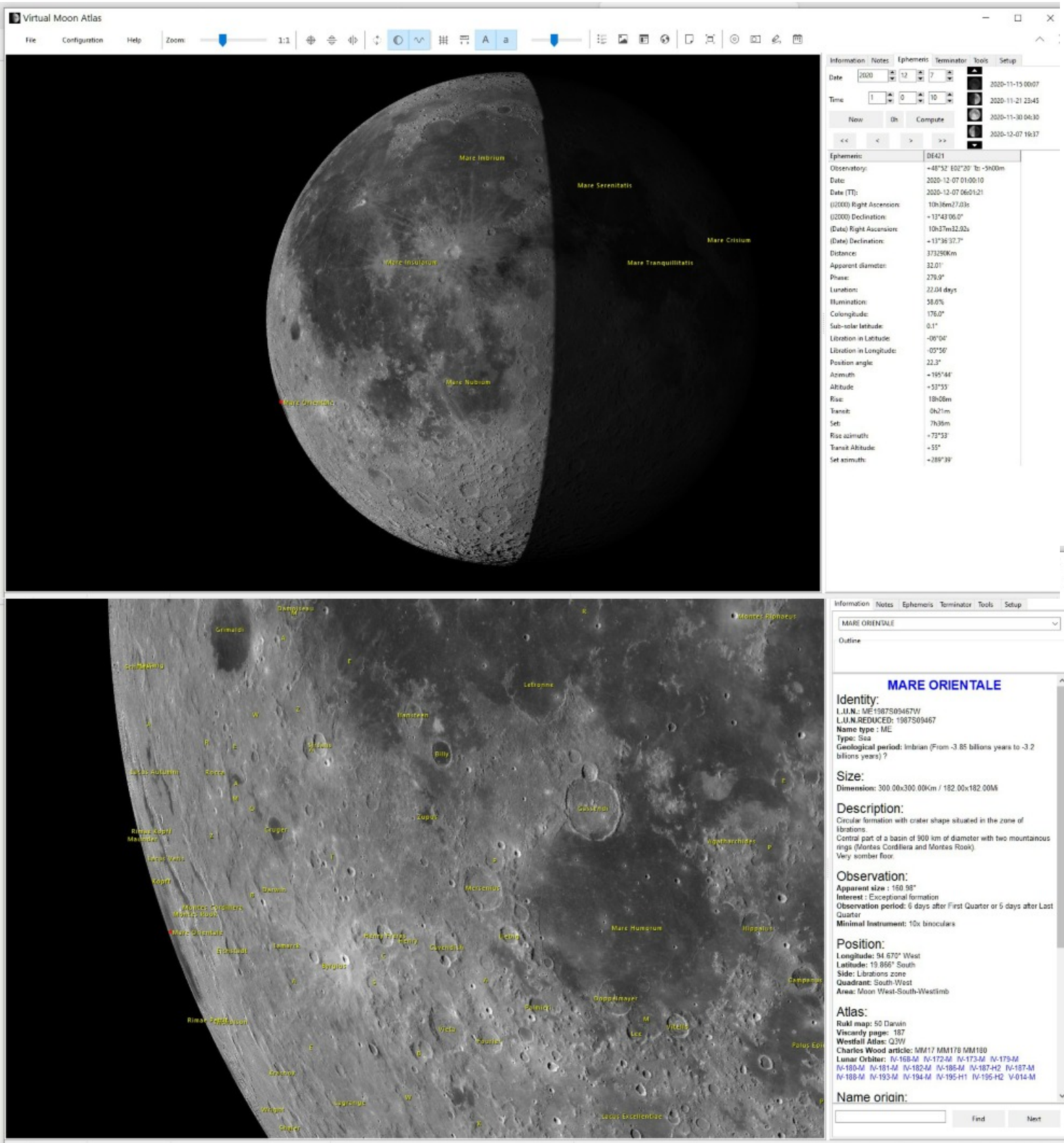
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The Sky This Month for December 2020 (continued)

This crater is normally hidden behind the western limb but occasionally the libration of the Moon allows you to see a part of it. John’s attempt was very successful, and I had fun using my moon globe to identify features along the limb.

Late on the evening of Dec 6th and continuing into the early hours of the 7th, the libration is highly favourable for Mare Oriental. There is special software you can use to determine the best time to view features on the Moon. One possible programme is *The Virtual Moon Atlas* which is free on the web and runs on Windows 10. I have included a couple of screen shots for December 7 at 1am as this seems to be the point of maximum exposure. You can spend time visually observing the Moon or try and capture an image. Either way it will be worth the effort and you’ll be observing a feature on the Moon that many have never seen.

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Charts generated using the *Virtual Moon Atlas*.

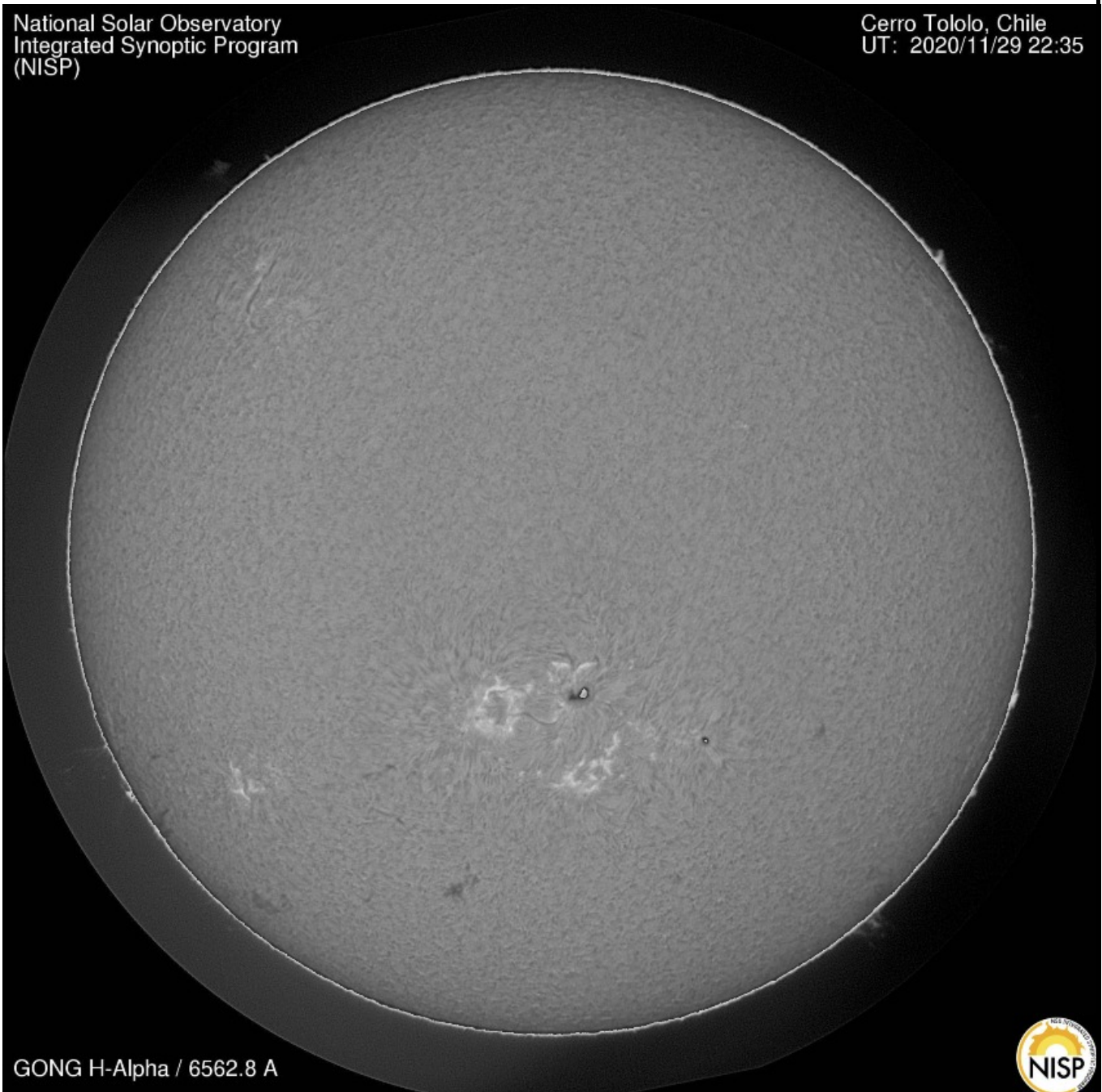
The Sky This Month for December 2020 (continued)

As the Sun moves away from solar minimum, we are starting to see much more activity. At the moment, there are three sunspot groups to observe and many prominences. Those of you just starting out in amateur astronomy shouldn't attempt to observe the Sun without help from an experienced observer. The risk of permanent damage to your eyes can be severe with blindness a real possibility. There are several methods used for safe solar observing. They are:

- Use a solar telescope.
- Attach a white light solar filter to the front of your telescope.
- Project the image of the Sun at the eyepiece of your telescope on paper.
- Make a cardboard box pinhole projector and project the image of the Sun on paper.
- Use official solar viewing glasses that are made specifically for that purpose.

This is the one area of amateur astronomy where taking safety precautions is critical. The best way to get an introduction into solar observing is to ask to look through a club member's solar setup. One of our club members, Brian Whitman, presented a Zoom video on solar viewing techniques this past summer. It was a well written and presented solar observing video primer. If anyone is interested in participating in a solar observing workshop, please let someone on council know.

This view of the Sun in Hydrogen Alpha wave lengths is very similar to the view through an amateur solar telescope. Watching the Sun evolve in real time is unlike any other form of observing and can be quite addictive.



*The Sun on November
29, 2020.*

*Image Credit:
National Solar
Observatory*



Observing Mare Orientale by John Gauvreau

Oh, there were a hundred other titles for this article that I could have used, from the practical (“Taking Advantage of Extreme Lunar Librations for Observations of the Lunar Far Side”), to the lyric (“Beyond the Distant Horizon”), to the whimsical (“Going Over the Edge; how observing the moon has made me a little loony”). Each would have appropriately described one aspect of this little observing adventure I went on. In the end I went with the simple and direct approach.

Last month, in early November, an opportunity presented itself to observe *Mare Orientale*, a large crater basin that sits just on the far side of the Moon. There are only a few months each year, and only a couple of days in each of those months, when the feature is visible. The day came and I was lucky enough to have clear skies and a good view. Let’s start with some background.

Why there is a near side and a far side in the first place

Of course we are all familiar with the near side of the Moon. First, of course, the fact that there is a near side and a far side is due to the Moon being gravitationally locked to the Earth. It’s not that the Moon doesn’t spin on its axis like Earth; it does. It’s just that the Moon spins in 29 ½ days, and it also orbits the Earth in 29 ½ days, so the two coincide perfectly and as it completes one orbit and one rotation a person standing in the middle (hey, just like us here on Earth!) will see only one side of the Moon facing inward. The near side. The far side is always facing away.

Well that’s quite a coincidence!

The orbit and the rotation coincide, but it’s not a coincidence (in the way we usually think). There is a reason behind this resonance. The Moon is tidally locked to Earth. Here’s how it works.

We all are aware of the Moon’s tidal pull on the Earth. The Moon’s gravity pulls the Earth toward it, and since one side of the Earth is closer to the Moon than the other side, it feels the pull a little stronger. So, stuff on the near side gets pulled toward the Moon a bit more than the rest of the Earth; it’s literally lifted up into space a bit. Things that move easily (like, oh...water in an ocean) lift quite a bit. Things that are harder to budge (like rocks) don’t move as much. So the water moves and the rocks stay and we see the ocean tides coming and going, as the water follows the Moon as it moves around the Earth.

Except the water isn’t following the Moon; at least not much. Mostly the big tidal bulge of water is staying in place and the Earth is rotating under the Moon. We spin on our axis once a day, so the tidal bulge (where the earth, water, rock, little kittens and everything else bulges up toward the Moon) sweeps across the surface of the Earth once a day. So how come there are two tides each day? Easy; just as the part of the Earth closest to the Moon feels its gravity strongest and is pulled up the most, so too does the part of the Earth farthest from the Moon (on the opposite side) feel its gravity weakest and is left lagging behind. Stuff like ocean water is left hanging in space as the whole Earth is pulled away from it. If you’re standing on some of that rigid rock next to some of that sloshy water, you move with the rock, the water lags behind and you see the water seem to rise above your feet, or your feet move below the surface of the water. So one tide as the water is pulled up from the Earth toward the Moon and a second tide on the opposite side of the planet as the Earth is pulled up from the water.

Hey, you said this was about the Moon, not Earth tides!

You’re right, so now just imagine the whole thing about tides except you’re standing on the Moon. A moon that is spinning fast. Let’s say as fast as the Earth; 24 hours. You look up and there’s the Earth in your sky and it’s a lot bigger than the Moon and creates much bigger tides (Earth is almost 4 times as wide as the Moon but it’s actually 81 times more massive. Look out!). Big enough to lift those rocks some (and a

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Observing Mare Orientale (continued)

good thing since there aren't any oceans and seas on the Moon, no matter what we call the Ocean of Storms or the Sea of Tranquility!).

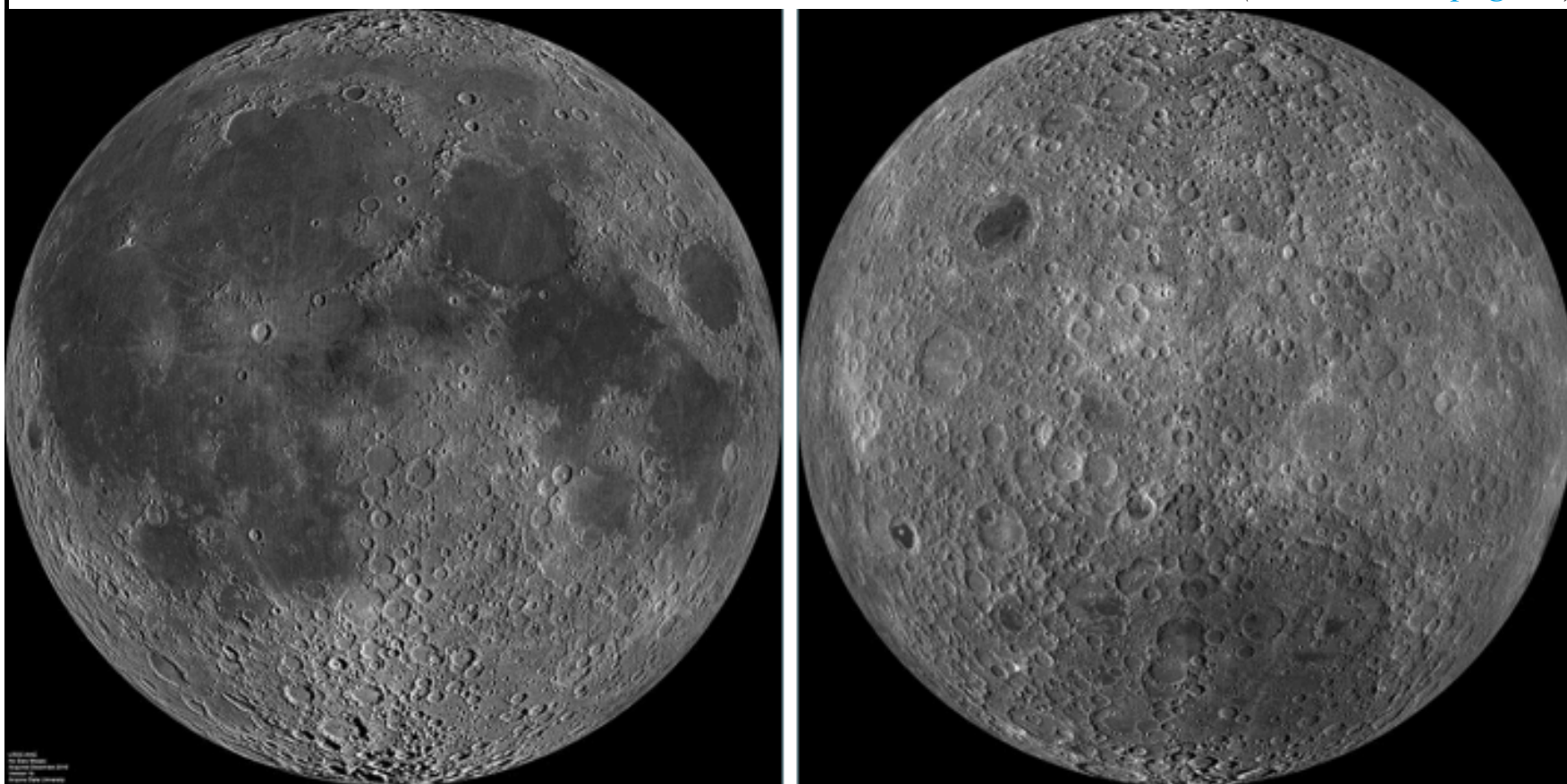
So there you are standing on the Moon and as you rotate, there goes the Earth overhead and here comes the tidal bulge. The rock you're standing on goes up and comes down. Quite a ride! Well, all that rock moving around causes quite a bit of friction and friction is really good at slowing down things that move (imagine putting sandpaper on the bottom of your toboggan and see how fast you go with all that friction). In this case, what is moving is the Moon around its axis, so it slows down due to friction and now it's not spinning in 24 hours. Now it's 2 days, now it's a week, now it's 2 weeks...and as the Moon rotates slower and slower the tidal bulge moves slower and slower and that means less friction. By the time the Moon is rotating in 29 ½ days (the same time as it takes to orbit the Earth) the bulge isn't moving at all; it is stuck in one place facing the Earth. No more movement means no more friction which means no more slowing down which means the Moon stays where it is. It is now locked with a rotation exactly matching its orbit and one side facing the Earth and one side facing away. A near side and a far side. Ta da.

This whole process took about a hundred million years, and it was billions of years ago. But it did happen and you can see the result every time you look at the Moon and see the same side every day. For the rest of your life.

Differences between the near and the far side

Oh yes, the near side and the far side are very different. The near side you are familiar with is dominated by the maria (plural for mare), which are the dark patches that make up the face of the man in the moon. They are named for bodies of water (not because long ago they thought they were water but because, in a brilliant bit of imaginative thinking, they thought that was how bodies of water would look if you could fly high above them). Mare Tranquilitatis (Sea of Tranquility, where Apollo 11 landed), Oceanus Procellarum (Ocean of Storms, one of the largest features on the Moon), Mare Serenitatis (Sea of Serenity, for all you Firefly fans), Lacus Somniorum (Lake of Dreams, candidate for best name on the Moon), Palus Putredinis (Marsh of Decay, or the Dead Marshes, which should be avoided when returning the One Ring to

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Near and Far Sides of the Moon. Image Credit: NASA

Observing Mare Orientale (continued)

Mount Doom), and Sinus Iridium (Bay of Rainbows, an easy to observe feature despite its total lack of colour. What were they thinking?). There're lots more. About a third of the near side is made up of dark maria.

The brighter areas are a more rugged terrain (hmm...can you use the word terrain when describing the Moon?). They are referred to as the Highlands, and are made up of mountains pushed up by ancient impacts, and rough surfaces that are actually much older than the dark maria.

The far side is almost all highlands, with practically no maria, or dark patches. There are a lot of craters. Craters piled on craters piled on craters. Have you looked through your telescope at the Moon and seen the south part at the bottom, where there are lots of craters and so much detail to look at? Well the far side is almost all like that. There are only a few maria there and they make up only 1% of the farside.

How Librations Work

So now let's go outside and look at the Moon. You would think that you could see 50% of the Moon's surface; the 50% that faces us. In fact, you can see a little more; up to 59%! No rocket required!

We get to see a little over the top and a little under the bottom because the Moon's orbit around the Earth is not level with our equator. So sometimes the Moon is above us a little and we can peek underneath, and sometimes it's a little below us and we can peer over the top. Excellent!

We also get to see a little around the sides, but for a different reason. The Moon's orbit is eccentric, meaning it is not a perfect circle centred on the Earth. Sometimes it's a little closer to us (that's when we see a Super Moon) and sometimes it's a little farther away (mini-moon?). When the Moon is closer it speeds up in its orbit, and when it speeds up it moves faster than it's rotating (remember how they matched up? Well now they don't) and we can see around the trailing side a bit. When the Moon is farther it moves slower and we can see the leading side a bit while we wait for it to catch up.

This apparent wobble up and down and side to side is called lunar libration (not libation, which can also make the moon seem to wobble, but for an entirely different reason!).

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Mare Crisium showing libration. Image Credit: Rob Kratowski (Earth Science Picture of the Day)

Observing Librations

Taking the libration into account and matching with the correct lunar phase, so that the part of the far side of the Moon that is showing is also in sunlight, means that at certain times of the year and month you get to peek around the corners a bit. With a bit of practice you can see this with your unaided eye. Mare Crisium is the round dark spot in the top right corner of the Moon. It's pretty near the edge and makes a good gauge. Sometimes you can see it really close to the edge of the Moon and sometimes there is quite a bit of white space between the dark spot and the edge. This change in appearance is due to libration.

Mare Oriental

And last we're back! Mare Oriental (the Eastern Sea) is actually an impact basin, where a large meteoroid hit the Moon long ago, puncturing the crust and allowing dark lava to fill up the now giant crater. It is one

of the very few dark maria on the far side, but it is just barely over the far side so if the libration is just right, you can catch a glimpse of it right on the edge of the Moon.

I realized that a good opportunity to see this feature was upon us. October would have worked but I missed that chance, so I was ready for the November apparition, which would last only a couple of days so I had to get out on just the right night.

Seeing Orientale means seeing the Moon when it is past full (otherwise the part we want to see is in darkness), which means a late night or early morning. On the night of November 4th I went out but the libration wasn't at its most extreme yet and although I could see nearby features, there was no sign of Orientale. I was out again on the night of the 7th. I knew it should be there at this point, but the seeing in



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Observing Mare Orientale (continued)

the atmosphere was so bad that the Moon was just a soft swimmy blob. It wasn't going to happen for me this night.

The next night, the 8th, I went to bed and got up early the next morning to see the Moon in the early morning sky. I had all my telescope gear that I would want to use for this observation ready and set out for me the night before. This was the optimum night and I had my fingers crossed for clear and steady skies.

My patience and diligence (come on, I deserve some credit for getting up at 4 in the morning for this!) were rewarded; this was the sky I wanted. As soon as my telescope was pointed at the Moon I could see the region I wanted and on closer examination it was actually quite easy to pick out Mare Orientale and several nearby features, including Lacus Autumni and Lacus Veris, two smaller dark patches surrounding Orientale, as well as the craters Kopf and Maunder. I could also see the far side of the bright ring that surrounds Orientale. I was seeing all the way across the great Mare. Success!

I got some pictures through the scope and then as the sky brightened I packed up and went back to bed. I would do it again and I hope you might try too. There is a window of opportunity on the morning of December 6th. If the sky is clear give it a try!



*Previous Page: Moon on November 9th.
Above: Close up showing Mare Orientale at the edge.*

Image Credit: John Gauvreau (both)



This article is distributed by NASA Night Sky Network.

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Visitors to Both Jupiter and Saturn

David Prosper

Have you observed Jupiter and Saturn moving closer to each other over the past few months? On December 21, the two worlds will be at their closest, around 1/5 of a full Moon apart! While the two gas giants may appear close, in reality they are hundreds of millions of miles apart. Despite this vast distance, a select few missions have visited both worlds by using a gravity assist from giant Jupiter to slingshot them towards Saturn, saving time and fuel.

Pioneer 11 was the first mission to visit both worlds! Launched in 1973, the probe flew past Jupiter in late 1974, passing just 26,400 miles above its stormy clouds. In 1979, it became the first spacecraft to encounter Saturn. Pioneer 11 took the first up-close photos of Saturn and its satellites, and made many exciting discoveries, including the detections of its magnetic field and a faint “F” ring, before departing Saturn and eventually, the solar system.

The Voyager missions quickly followed up, taking a “Grand Tour” of the four largest and most distant planets in our solar system. Both probes were launched within two weeks of each other in 1977. Voyager 1 flew past Jupiter in March 1979, discovering Jupiter’s faint ring and two new moons, along with active volcanoes on Io’s surface! The probe then flew past Saturn in November 1980, discovering five new moons, a new “G” ring, mysterious ring “spokes,” and “shepherd moons” shaping the rings. After a brief encounter with Titan revealed evidence of complex organic chemistry and liquid on the moon’s frigid surface, Voyager 1 was flung out of the plane of the solar system. Following close behind, Voyager 2 took detailed photos of Jupiter’s moons and cloud tops in July 1979. Flying past Saturn in August 1981, Voyager 2 measured the thickness of Saturn’s rings and took detailed photos of many of its moons. This second explorer then captured images of Uranus and Neptune before leaving our solar system.

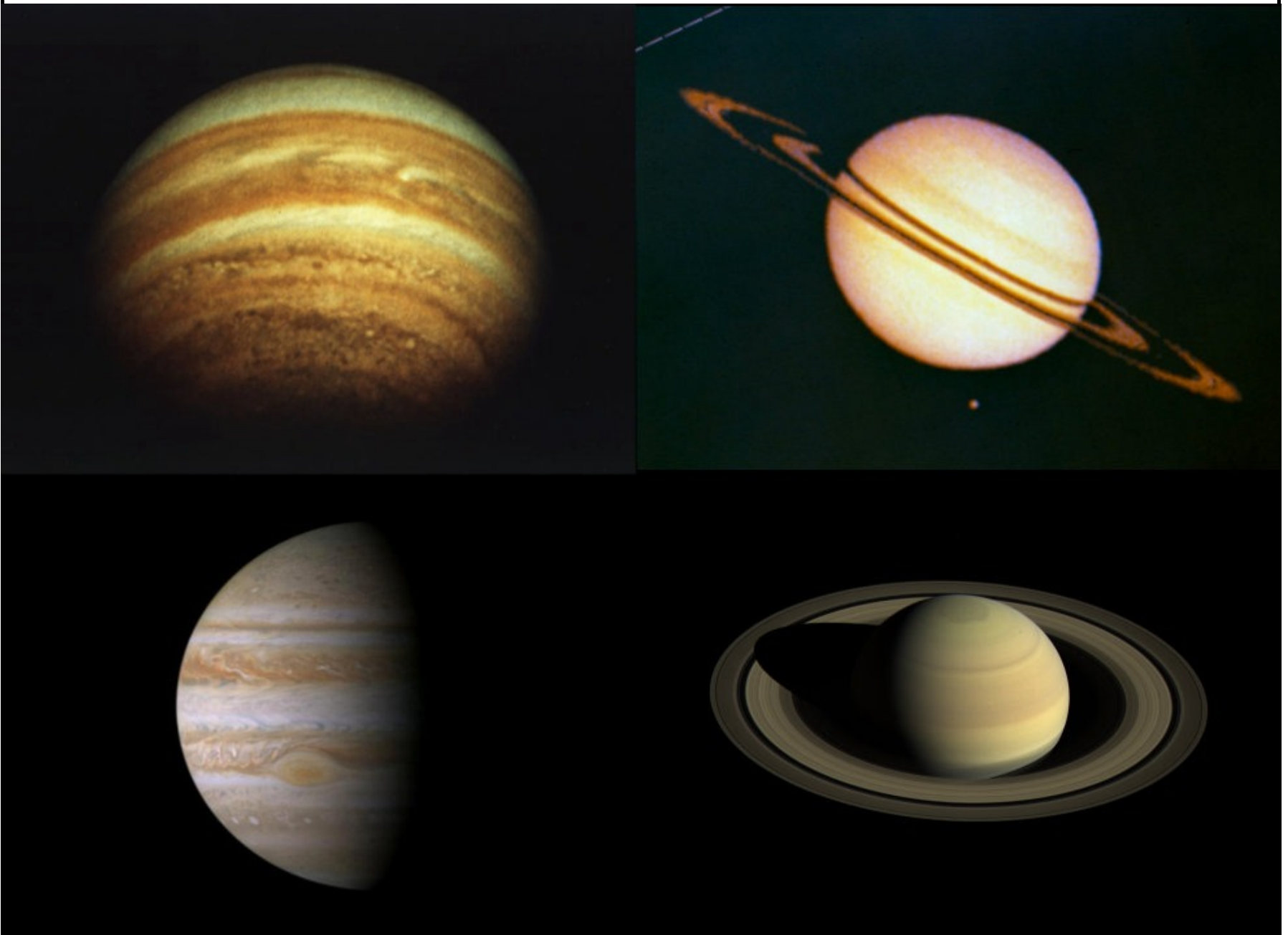
Cassini-Huygens was the last mission to visit both worlds. Launched in 1997, the mission flew past Jupiter in late 2000 and took incredibly detailed photos of its stormy atmosphere and faint rings. Cassini entered into Saturn’s orbit on July 1, 2004. The Huygens probe separated from Cassini, landing on Titan to become the first probe in the outer solar system. Cassini discovered geysers on Enceladus, fine details in Saturn’s

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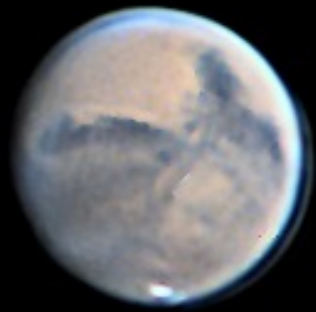
NASA Night Sky Notes (continued)

rings, many more moons and “moonlets,” the changing oceans of Titan, and seasonal changes on Saturn itself. After revolutionizing our understanding of the Saturnian system, Cassini’s mission ended with a fiery plunge into its atmosphere on September 15, 2017.

What’s next for the exploration of the outer worlds of our solar system? While Juno is currently in orbit around Jupiter, there are more missions in development to study the moons of Jupiter and Saturn. Discover more about future NASA missions to the outer worlds of our solar system at [nasa.gov](https://www.nasa.gov).



The difference in technology between generations of space probes can be stunning! The top two photos of Jupiter and Saturn were taken by Pioneer 11 in 1974 (Jupiter) and 1979 (Saturn); the bottom two were taken by Cassini in 2000 (Jupiter) and 2016 (Saturn). What kinds of photos await us from future generations of deep space explorers?



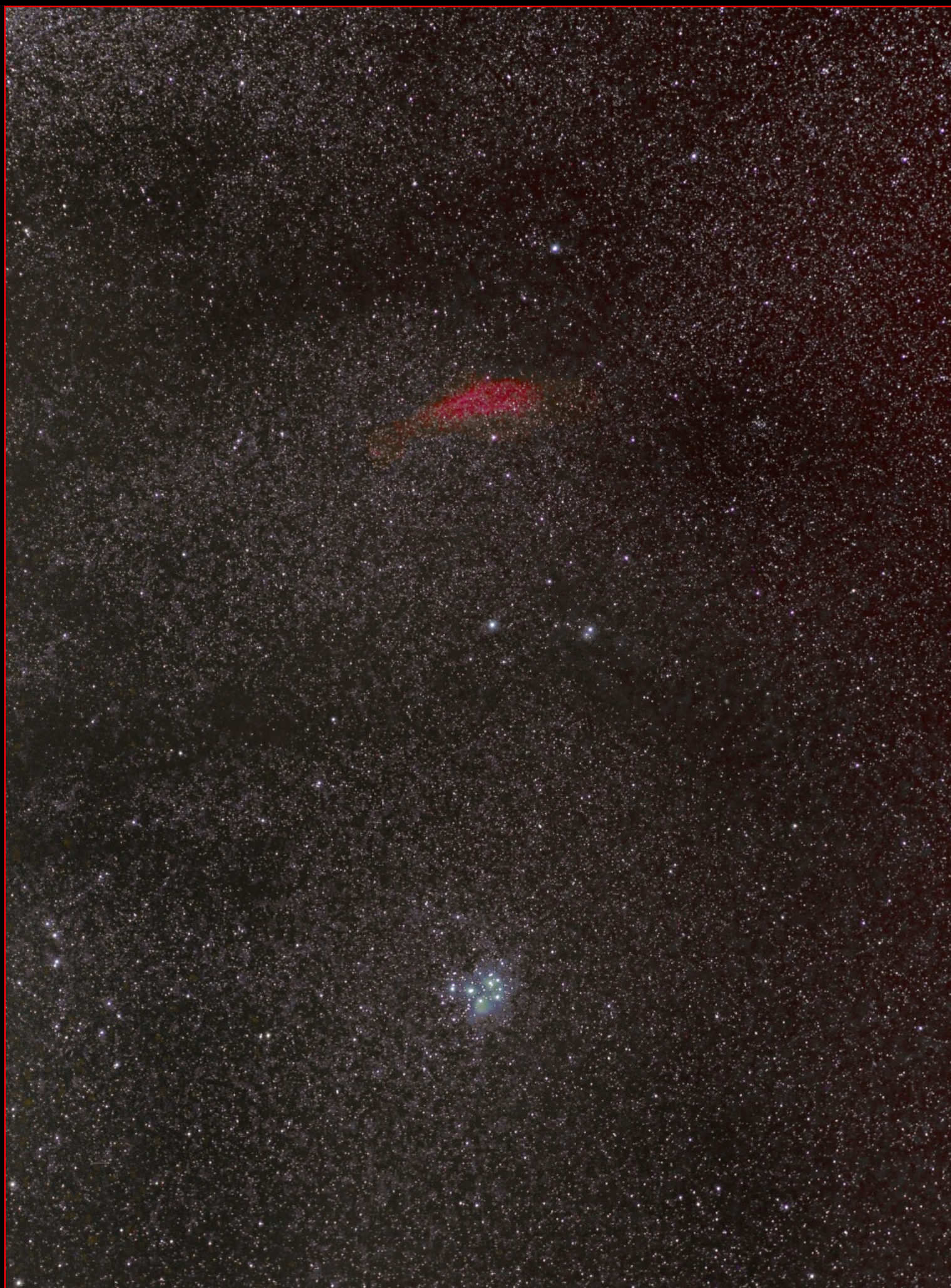
Mars, on November 8, 2020.
Taken with a ZWO ASI 224MC camera through
a Celestron Celestron AVX 8" SCT;
stack of 1500 frames
by **Alex Kepic**



The Moon with Cloud Halo,
by **John Gauvreau**



The Helix Nebula (NGC 7293), a Planetary Nebula in Aquarius
20 x 90 seconds; total exposure time: 30 minutes (cropped),
with Canon 40D DSLR and 300mm Tamron lens at ISO 800 and f/2.8
by **Bob Christmas**



The California Nebula (NGC 1499) and the Pleiades cluster (M45)
25 minutes of total exposure time with DSLR and 35mm lens at ISO 1600
by John Gauvreau



2019-2020 Financial Statements by Ann Tekatch

CASH FLOW

Income	31-Oct 2020	31-Oct 2019	31-Oct 2018
Memberships	\$3,970.00	\$3,135.00	\$3,995.00
HAA Calendars	\$2,840.00	\$3,140.00	\$3,072.00
RASC Handbooks	\$750.00	\$0.00	\$0.00
Clothing Sales	\$0.00	\$1,245.00	\$0.00
50/50	\$287.00	\$672.50	\$485.25
Coffee Fund	\$0.00	\$0.00	\$0.00
Advertising Revenue	\$0.00	\$0.00	\$0.00
Cash Donations	\$200.00	\$190.00	\$80.00
Messier Marathon	\$0.00	\$0.00	\$0.00
Banquet Revenue	\$0.00	\$0.00	\$1,260.00
Miscellaneous	\$0.00	\$0.00	\$0.00
Prepaid Postage	\$0.00	\$0.00	\$0.00
Total Income	\$8,047.00	\$8,382.50	\$8,892.25

Expenses	31-Oct 2020	31-Oct 2019	31-Oct 2018
Insurance	\$1,157.76	\$1,083.24	\$914.76
EH Newsletter	\$0.00	\$0.00	\$0.00
Brochures/Promotion	\$0.00	\$0.00	\$24.86
HAA Calendars	\$2,293.90	\$2,340.54	\$2,367.46
RASC Handbooks	\$596.93	\$0.00	\$0.00
Clothing Sales	\$0.00	\$1,473.53	\$0.00
Donations Outgoing	\$955.00	\$700.00	\$950.00
Depreciation Expense	\$355.87	\$344.15	\$420.81
PO Box Rental	\$190.97	\$187.58	\$183.06
Speakers Allowance	\$150.00	\$350.00	\$196.06
Office Supplies	\$31.62	\$165.21	\$28.69
Postage	\$64.32	\$0.00	\$0.00
Banquet Costs	\$0.00	\$0.00	\$1,186.31
Public Education	\$575.75	\$41.03	\$0.00
Kids Outreach Kit	\$0.00	\$0.00	\$0.00
Hall Rental	\$988.52	\$1,290.00	\$1,130.00
Prepaid Hall Rental	\$0.00	\$0.00	\$1,290.00
Miscellaneous	\$562.89	\$517.84	\$209.42
Equipment Repairs	\$0.00	\$0.00	\$0.00
Website	\$247.31	\$130.97	\$492.78
Total Expenses	\$8,170.84	\$8,624.09	\$8,104.21

Surplus/Deficit	-\$123.84	-\$241.59	\$788.04
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(Continued on [page 18](#))

2019-2020 Financial Statements (continued)

BALANCE SHEET

Assets	31-Oct 2020	31-Oct 2019	31-Oct 2018
Bank	\$11,674.48	\$9,454.08	\$7,128.27
Cash	\$0.00	\$0.00	\$0.00
Inventory	\$0.00	\$0.00	\$0.00
Prepaid PO Box Rental	\$190.97	\$190.97	\$187.58
Prepaid Mailing Expense	\$0.00	\$0.00	\$0.00
Prepaid Liability Insurance	\$0.00	\$0.00	\$0.00
Prepaid Hall Rental	\$0.00	\$0.00	\$1,290.00
Accounts Receivable	\$0.00	\$0.00	\$0.00
Prepaid Banquet Expenses	\$0.00	\$0.00	\$0.00
Prepaid Calendars	\$0.00	\$2,293.90	\$2,340.54
Total Current Assets	\$11,865.45	\$11,938.95	\$10,946.39
Fixed Assets			
Equipment	\$1,788.74	\$1,414.08	\$1,683.23
Total Fixed Assets	\$1,788.74	\$1,414.08	\$1,683.23
Total Assets	\$13,654.19	\$13,353.03	\$12,629.62
Liabilities	31-Oct 2020	31-Oct 2019	31-Oct 2018
Deferred Membership Revenue	\$2,965.00	\$2,540.00	\$1,575.00
Banquet Tickets sold	\$0.00	\$0.00	\$0.00
Accounts Payable	\$0.00	\$0.00	\$0.00
Total Liabilities	\$2,965.00	\$2,540.00	\$1,575.00
Equity			
Opening Balance	\$10,813.03	\$11,054.61	\$10,266.57
Adjustments	\$0.00	\$0.00	\$0.00
Donated Equipment (Book Value)	\$0.00	\$0.00	\$0.00
Current Year	-\$123.84	-\$241.59	\$788.04
Closing Balance	\$10,689.19	\$10,813.03	\$11,054.61
Total Liabilities and Equity	\$13,654.19	\$13,353.03	\$12,629.61

(Continued on [page 19](#))

2019-2020 Financial Statements (continued)

PROFIT & LOSS

Revenue (Net)	31-Oct 2020	31-Oct 2019	31-Oct 2018
Membership	\$3,970.00	\$3,135.00	\$3,995.00
Calendars	\$721.25	\$799.46	\$953.25
Cash Donations	\$200.00	\$190.00	\$80.00
50/50 Draw	\$287.00	\$672.50	\$485.25
RASC Handbook Sales	\$153.07	\$0.00	\$0.00
Donations in Kind	\$0.00	\$0.00	\$0.00
Intangible Donations	\$0.00	\$0.00	\$0.00
Clothing Sales	\$0.00	-\$228.53	\$0.00
Net Revenue	\$5,331.32	\$4,568.43	\$5,513.50

Depreciation Table	31-Oct 2020	31-Oct 2019	31-Oct 2018
Opening Balance	\$1,414.08	\$1,683.23	\$2,104.03
Depreciation Full Year	\$282.82	\$336.65	\$420.81
Donated Equipment	\$0.00	\$0.00	\$0.00
Additions	\$830.53	\$75.00	\$0.00
Sales	\$100.00	\$0.00	\$0.00
Net	\$730.53	\$75.00	\$0.00
Depreciation Part Year	\$73.05	\$7.50	\$0.00
Total Depreciation	\$355.87	\$344.15	\$420.81
Closing Balance	\$1,788.74	\$1,414.08	\$1,683.23

UPCOMING EVENTS

December 11, 2020 - 7:30 pm – Virtual Online H.A.A. Meeting for members. The meeting will be conducted on the platform Zoom. Our main speaker will be Dr. Yanqin Wu, who will talk about extrasolar planets. Be on the lookout for an invitation e-mail with a meeting link. You may download the Zoom app for various platforms from Zoom's [Download Center](#)

Due to the COVID-19 Coronavirus pandemic, all *in-person* Hamilton Amateur Astronomers meetings are suspended until further notice.

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All active HAA members have the privilege of access to an exclusive HAA members only dark sky location.

Be on the lookout for e-mails with dark sky observing details. Space is limited.

The Harvey Garden HAA Portable Library



Contact Information

E-mail: library@amateurastronomy.org