Event Horizon

Volume 26, Number 2
December 2018

From The Editor

A heartfelt thank you to all who have contributed articles and images in 2018!

See you in the new year!

Clear Skies!

Bob Christmas,
Editor

editor 'AT'
amateurastronomy.org

Chair's Report by John Gauvreau

This month sees the winter solstice arrive and the season change from autumn to winter but it sure feels like it's happened already! I for one am really missing the clear skies and mild temperatures we had last fall.

Welcome new Councillors

Last month we were introduced to the elected members of council who have taken on the various directorships. This month I would like to introduce you to the club's Councillors at Large, members who join council without a specific portfolio. These members are just as valuable and hardworking as the elected directors and have an equal say and vote on council.

This year there are seven councillors at large; Brenda Frederick, Sue MacLachlan, Dee Rowan, Barry Sherman, Gary Sutton, Bernie Venasse and Denise White. Brenda returns to this role again having served in this capacity for many years now. Sue, Dee and Gary are also returning with their enthusiasm and energy. Barry and Bernie

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IN THIS ISSUE:

Chair's Report (continued)

join the ranks of Councillors at Large having served on previous councils as elected directors; Barry as last year's education director and Bernie having served as Chair for the past three years. And I am delighted that Denise has returned to council after a break last year. Every one of these people has a valuable voice and I am very happy to have them as part of such a great team.

Councillors at Large participate in many capacities, helping where needed or taking on new projects. This past summer Sue and Dee organized the club's 25th anniversary picnic and Denise has run the club's library since its inception. You can find it at each monthly meeting and members are not only welcome to use it but encouraged to do so! Denise will be there to show you how it works. She has done a great job and the library is a welcome benefit to the members. Sue is overseeing the coffee and treats that will be there for the Christmas social at the next meeting, with lots of help from Brenda. You also saw Brenda last month handing out the door prize tickets. There are so many ways in which these members contribute and as you can see the club wouldn't have half the fun things we do without them.

This year Bernie is exploring a variety of projects that he has in mind for the club. We are always looking for new ways to improve the club and Bernie is our new Director of Special Projects with just that in mind. I'm sure you, just like me, look forward to hearing what suggestions he has in mind.

As always, there is lots to do and room for anyone who wants to join in and help, whether on council or as a non-council member. This is our club and participating is what makes it work so well for all of us.

Fall Telescope Workshops

In the middle of November the HAA hosted its annual fall Telescope Workshop. Previously we had held a scope clinic for anyone to show off their gear, talk and teach, and help newcomers and the public getting their scopes set up and repaired if necessary. This year instead we held a series of short presentations from various members, each one about a different aspect of beginner astronomy. It was a big success with lots of new members and public in attendance. A big thank you goes out to all who made this a reality. Aside from our presenters, Jim Wamsley, Barry Sherman, Bernie Venasse, Sue MacLachlan and Matthew Mannering, there were also many who helped out behind the scenes, setting up the room, manning the tables and so on. This new format worked very well, in no small part to the great job everyone did. For those that enjoy the informal interaction of the traditional scope clinic, never fear! We will be having another of our tried and true Scope Clinics in January. Get your gear ready (bring your new astro-toys that you got for Christmas!) and come for show and tell! Talking, mingling and seeing all the great astronomy equipment is always a fun evening.

2019 Calendar is here!

Every year for over 10 years now the HAA has published its annual Celestial Events Calendar. This beautiful wall calendar features images from club members and is loaded with lots of info for the enthusiastic observer. Matthew Mannering is in his second year as editor and last month gave a great presentation showcasing the many beautiful pictures included this upcoming year. These calendars will be for sale for $15 each or two for $25 at the December meeting. All the proceeds go back to the club to keep things running for another year. These make great gifts that show your friends and family just what it is you're doing outside all night with your telescope!

(Continued on page 3)

Masthead Photo: *The Pleiades (M45), by Peter Wolsley.*

Stack of 12 images taken September 17, 2018 from Sauble Beach, ON, with his Ha modified Nikon D5300 DSLR camera through his 80mm refractor with 0.85 focal reducer/flattener. Exposures: 12 x 4 minutes = 48 minutes total @ ISO 800. Note the faint detail of the molecular clouds. North is to the left.

Chair's Report (continued)

Upcoming Meeting

Friday December 14th will be the last meeting of this calendar year. Out guest speaker will be Francois van Heerden who will be speaking about using video astronomy for public outreach. I enjoy outreach so much and am very much looking forward to his talk. I also look forward to Steve Germann's monthly talk about the current things to see in the sky.

This month, aside from the usual door prizes (a free ticket to anyone that arrives by the 7:30 start time!) and the 50/50 draw, we will be raffling off a beginners telescope. If you are a beginner and would like to participate in this draw, you can get a ticket at the table at the back of the room. One free ticket per person.

And again this year we will be having an extended break for socializing with coffee and treats. Please feel free to bring in any special goodies you would like to share with your fellow club members. 'Tis the season!

Finally I want to send warm wishes and good thoughts to all this season. However you spend these last weeks before the calendar turns once again I hope you can look back on a good year and look forward to an even better one. I share the sentiment of Clement C. Moore, who might have been speaking directly to us astronomers when he closed his classic Christmas poem with the words "and to all a good night."

H.A.A.'s Loaner Scope Program

We at the HAA are proud of our Loaner Scope Program.

If you don't have a telescope of your own and want to make use of one for a month or so, you can borrow one of our fine loaner scopes.

Please contact Jim Wamsley, at: 905-627-4323
or e-mail Jim at: *secretary 'AT' amateurastronomy.org*

and we'll gladly get one signed out for you.

HAA Helps Hamilton

To support our community, we collect non-perishable food items and cash for local food banks at our general meetings. Please bring a non-perishable food item to the meeting or a donation of cash and help us help others.

Hamilton Food Share
Hunger. It's just unacceptable.

Our donations go to Hamilton Food Share, which delivers them to various food banks around the Hamilton area.
If you would like to help or have any questions about this initiative, please contact the H.A.A.

Hamilton Amateur Astronomers

Christmas Social

Friday December 14, 2018

Hamilton Spectator Building

General Meeting 7:30 pm

Christmas Social 8:30pm

Guest Speaker:

Francois van Heerden, Avid Amateur Astronomer

Topic: Mallincams: For Outreach and Observing in Light Polluted Areas

Christmas Social

The regular meeting break will be extended to allow members and guests to mingle over coffee and treats. If you are able to contribute an item to the treat table such as Christmas baking/sweets, Timbits, a small tray of fruit or veggies, etc. please contact Sue MacLachlan at smaclach@teksavvy.com

Coffee and water will be provided.

HAMILTON Food Share

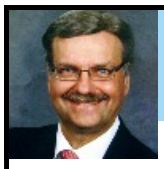
As always the HAA will be accepting non-perishable food items or cash donations for the Hamilton Food Share.

Hamilton Amateur Astronomers 2019 Celestial Events Calendar

The HAA once again offers its wall calendar available for sale starting in November. This beautiful calendar features images exclusively by your fellow HAA members. They make wonderful gifts and look great when displayed at home or office.

The price is $15 each or two for $25.

Any revenue generated from sales goes back into the club to help support club activities.



The Sky This Month for December 2018 by Steve Germann

December and January have the longest nights of the year. That is especially valuable when looking near the West at sundown, the East at sunrise, or the south at either of those times. The long and the short of it is that it's a good time for amateur astronomers who are properly dressed for the cold.

The Winter Solstice

The reason the nights are so long in winter has to do with the Earth's axis of rotation pointing away from the sun in the Northern Hemisphere, meaning that the sun is illuminating less of the northern hemisphere. So it stands to reason that any point on Earth in the Northern Hemisphere, rotating parallel to the equator, is going to get less hours of sunlight.

It's becomes extreme at the Arctic Circle, where for 1 24 hour period, the sun will not rise. North of the Arctic Circle progressively more 24 hour periods lack the sun. By the time you get to the North Pole, there are 6 months without Sun, and then 6 Months when the Sun does not fully set.

I fiddled with the date on this page to see when the north Pole was no longer in darkness.

https://www.timeanddate.com/worldclock/sunearth.html?month=1&day=31&year=2019&hour=4&min=42&sec=0&n=3368&ntxt=Alert&earth=0

I think even after a session of observing that is 80 days long (see below), I would need a fairly long rest.

Daytime is a good time to process images, too. Unfortunately, some of this 6 month period is spent in perpetual twilight. Roughly 40 days before the Solstice is the first time you actually get out of Astronomical twilight, and the real observing can begin. Then it is continuous for 80 days of night, before again transitioning into continuous twilight. At the North pole there is not even a 24 hourly variation. Just dull twilight slowly getting brighter.

Just to complicate things, there is a place called 'North Pole, Alaska' and I can by mistake pull up a light curve for it. Here is a nice diagram that illustrates the concept.

https://www.timeanddate.com/sun/@5870294

Here specifically, we see that as the day gets shorter the period of twilight remains about 3 hours on each side.

At the real North Pole, (there is no city to use to get that graph computed) the graph would have no daily variation at all (a vertical stripe in the graph would be all one colour), and by January 31 there is no longer perpetual 'night'. I cannot make the graph for the North Pole, but I *can* make one for the South Pole because that has a mailing address. The graph at the top of the next page shows the concept. If they allowed other locations, you would see some variation just a few hundred miles from the pole.

You can get an interactive version using this link:

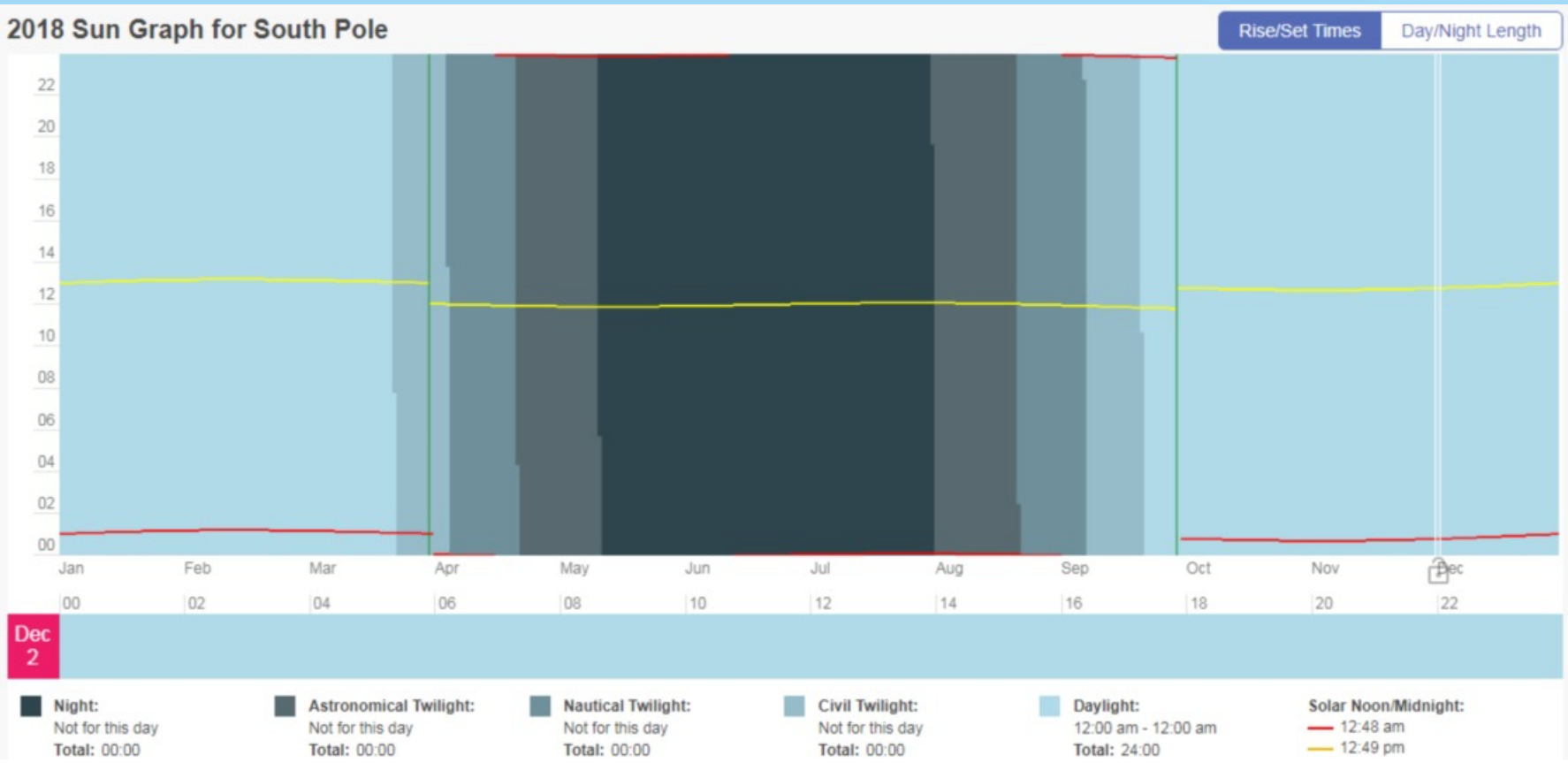
https://www.timeanddate.com/sun/antarctica/south-pole

So that's really about 80 days of continuous darkness (as opposed to twilight) and the rest of the time there are daily incursions of twilight on the horizon. So it is really true that 'the days are 6 months long here'.

Noctilucent clouds would be another issue during the twilight and start of night periods observed from the North Pole.

(Continued on page 7)

The Sky This Month for December 2018 (continued)



2018 Sun Graph for the South Pole, from from the timeanddate.com Website

Perceptions of the Solstice before Telescopes

So let's think about how the ancients would have understood a solstice.

From a given point on land, say the top of a hill, an observer can note the direction of sunrise on each day. Maybe even write something down about what was behind the sun when it rose. During the year, the point the Sun rises from will change, and there will be a day when the Sun rises furthest south. That would be (in the Northern Hemisphere) the Winter Solstice.

How much different will the Sun's point of rising be on that day compared to the day before or after? Well the Photographer's Ephemeris will tell us easily.

Sunrise Azimuth, viewed from the Syndenham Road Lookout, is 122.1 degrees on Tuesday, December 18th, and 122.2 degrees every day until Tuesday, December 25 when it is 122.1 degrees again.

One tenth of a degree is about 1/5 of a solar diameter. It would be pretty hard to really detect the Solstice using the apparent point of sunrise. However, there would be no question the Sun is rising far south. 122.2 degrees compares to the Summer Solstice when the Sun's direction at sunrise is 55.9 degrees for the 3 mornings near June 21 2019.

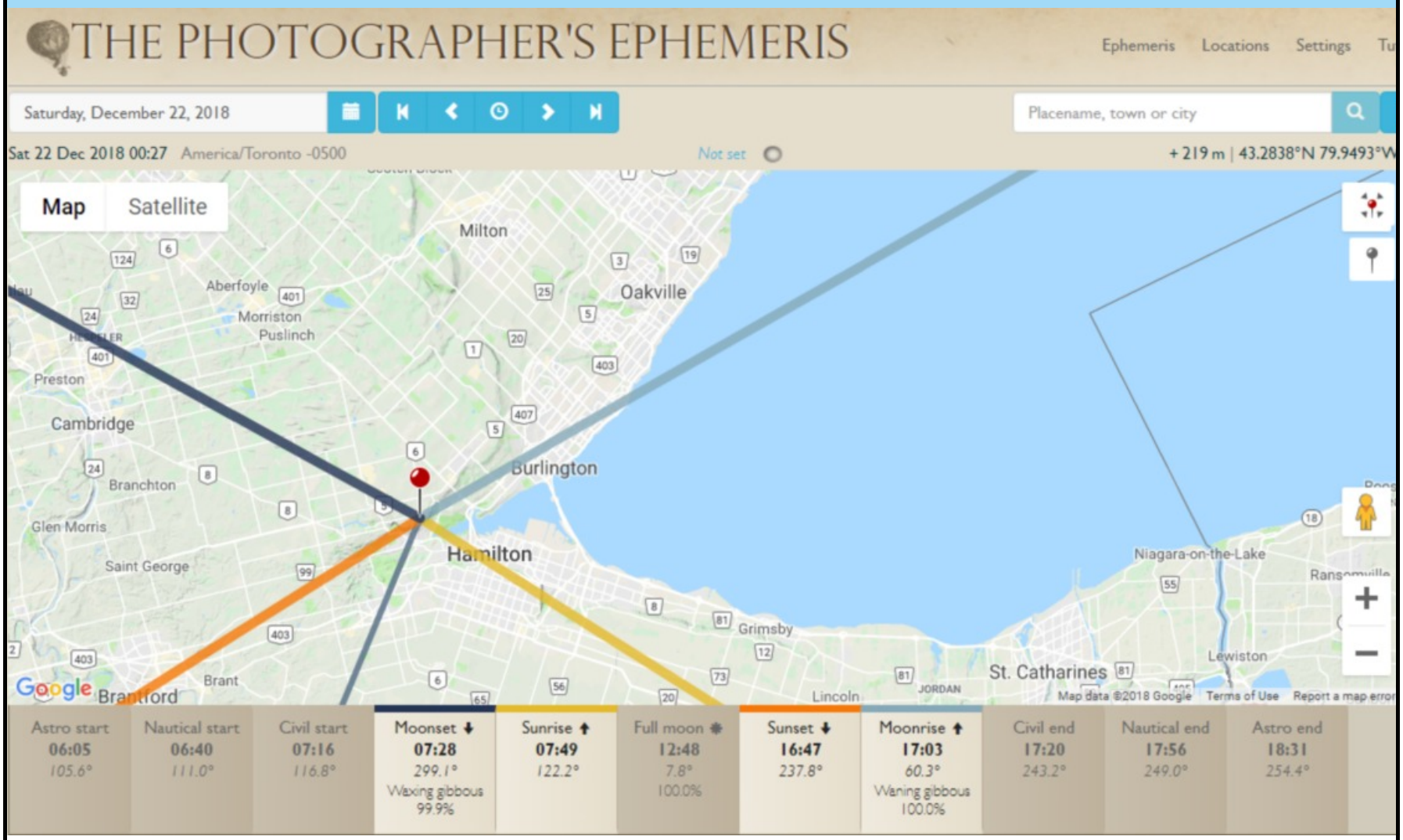
70 degrees is a lot. Anyone can notice that.

They can also look at the Sun's altitude at local Noon for a clue about solstices.

At local Noon on December 21, the Sun's altitude will be 70.2 degrees, and the same for 3 days in a row. Again, you would need to have some kind of post and draw a line for the edge of the shadow every day, to see this subtle difference. Also the shadow edge will be blurred by half a degree and that will make drawing the point you would call the edge of the shadow that much harder.

(Continued on page 8)

The Sky This Month for December 2018 (continued)



The Directions of Sunrise, Sunset, Moonrise and Moonset for December 22, 2018, from the Protographer's Ephemeris Website

Hat's off to the ancient astronomers who took observing the path of the Sun in the sky seriously.

As I have noted in the past, Astrology paid a lot of bills. And it still gives us some nicely named constellations with stories too. I'll take its legacy and run with it.

I am always patient when I distinguish between Astronomy and Astrology.

The Moon

The *Lunar X* is finally showing up at civilized hours. This document talks about the discovery of the Lunar X (aka the Werner X) and ponders why more people don't know about it, and more specifically, why it took almost 400 years to be discovered.

http://wasociety.us/Lunar-X.pdf

For instance in December, you can spot it for a while on December 14th, at 22:46 UT which is about an hour before our HAA meeting. (5:45 PM)

12/14/2018 2246UT -0.935 @ X

(Continued on page 9)

The Sky This Month for December 2018 (continued)

This page gives a chart for 2018 and thanks go to 'Dana T'. And here's a video of the Lunar X appearing and getting washed out, in various speeds and magnifications:

https://www.youtube.com/watch?v=cwwJoQ-7_-E

Meteor Showers

The *Geminids Meteor Shower* peaks on the night before our December meeting, on Thursday December 13th into Friday morning. This page gives the details:

https://www.timeanddate.com/astronomy/meteor-shower/geminids.html

The key details are: the number of meteors in the Geminids is the same as the Perseids, and being high in the sky, you will have the radiant overhead. The Perseids radiant does not even rise until late at night.

So truth be known, the Geminids is the best Meteor Shower of the year, and if we had a warmer climate, it would win hands down.

This year is especially good, because the Moon is before 1st quarter and will not interfere but on the contrary will offer a nice observing opportunity before the sky gets really dark. And it will get really dark, because this is near the solstice.

Comets

Comet 46P Wirtanen is up and at Magnitude 6.5 should be visible in binoculars from a dark place.

46P Wirtanen 6.5 26/11/2018 132° 29.1° 194° (SSW) Cetus

As of November 26, it's in Cetus and it is up 30 degrees at 11 PM.

Here's a page you can use to get a finder chart anytime...

https://heavens-above.com/comet.aspx?cid=46P&

3 Juno

While you are checking out 46P Wirtanen, take a look for 3 Juno which is in the same part of the sky:

https://heavens-above.com/MinorPlanet.aspx?desig=3&

Both are very near Eridanus which is to the right (west) of Orion and south of Taurus.

Variable Stars

Mira is also in the same region of the sky, and was predicted to achieve its annual maximum just a week ago, and should still be bright. Here's the page that predicts Mira's peak for years to come.

https://en.wikipedia.org/wiki/Mira

If you have not seen Mira before, here's your chance to use binoculars and appreciate its position.

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The Sky This Month for December 2018 (continued)

Over the next month it will dim considerably, losing about a magnitude per month. Once you have seen it, you can come back to it a few nights later and see it dim. Annually, Mira is near the Sun, and this causes gaps in its recorded brightness.

It would be cool to have a robotic telescope in the same orbit as Earth, on the opposite side of the Sun. Then we could always see everything in that direction.

An expensive toy? I think not.

Moonrise

Well, a 100 percent illuminated Moon will rise on Saturday evening, December 22, at 17:03 which is probably not when the stores are about to close (see Photographer's Ephemeris diagram on page 8).

December's Moon is not the Supermoon, but January's Moonrise is a close tie with February for Supermoon status in 2019.

This page gives all the useful information:

https://www.vercalendario.info/en/when/next-super-moon.html

November Astrophysics Group Meeting Summary by Mike Jefferson

The members in attendance were Doug Black, Doug Currie, Steve Germann, Mike Jefferson, Ian Rabenda and Gary Sutton. Most of the refreshments were provided by Doug Black and Mike Jefferson.

The meeting opened with a general discussion about the possibility of some future plans for the HAA, dedicated to astrophysical discussion and research. This topic moved to a consideration of the Voyager spacecraft being on the border of interplanetary and interstellar space and how large or small the 'crews' still monitoring them, are.

Mike handed out, for perusal, four booklets of instructions: one for "ImageTOOLSca"; 3 for "Vspec" , a spectral analysis programme developed by Valerie Desnous. Doug B. noted the similarity to Rspec (the spectroscopy programme developed by Tom Field).

The meeting then migrated from Doug B.'s sumptuous living room to his computer room, where he presented a PowerPoint dissertation on possible future directions for HAA. Some of this would follow very general interests, some would follow research-based activity and some would follow discussion-focused activity (probably similar to our old "Cosmology Discussion" groups). There seems to be, among HAA Astrophysics adherents, the need to have some goals to aim for.

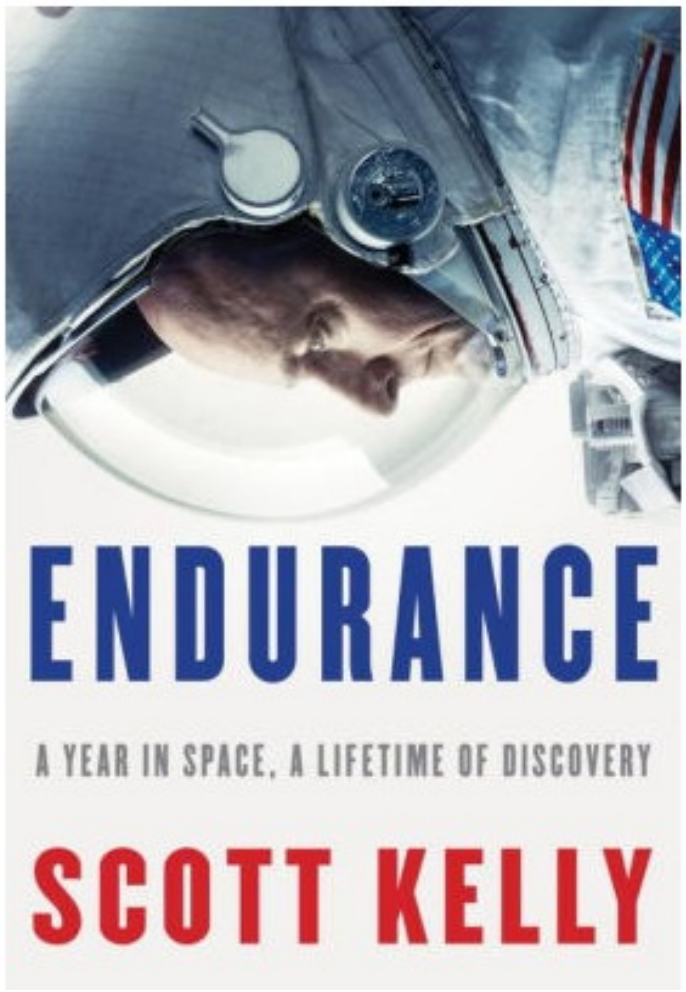
Doug B. handed out two questionnaires: one for Astrophysics, which we answered; the second for later consideration. These attempt to explore future HAA directions.

Because the December HAA general meeting is on December 14 any proposed Astrophysics meeting could not be earlier than December 21, which would be far too close to Christmas. Therefore, the next Astrophysics meeting will be on January 18/2019, right before the "Telescope Clinic" on the 19th of January 2019.

Our thanks go to Doug B. for the hospitality extended to HAA Astrophysics. Stay tuned to the HAA website for meeting announcements or cancellations.

Endurance: A Book About Life Off Earth by Jo Ann Salci

Wednesday, November 14, 2018; Fort Lauderdale, Florida, USA:



I awoke to the beauty of the southern Florida early morning sky - and the passing overhead of the International Space Station (ISS). This inspired me to write about a book I recently read, titled Endurance by American astronaut, Scott Kelly. He spent a year on the ISS and his book describes his experience.

But, first about the beautiful early morning (5:30 a.m.) sky! Venus shone brightly that morning, with Spica and Arcturus also very visible. Cloud remnants from overnight rains dotted the sky and stars could be seen between them. Watching the sky transition from astronomical thru nautical and civil twilight into daylight was remarkable – especially since Venus was visible throughout this transition.

In addition to this scene, I was able to see the ISS pass overhead, its panels shining brightly as it traveled into our sunrise. There is a great website that allows you to track the current (and future) location of the ISS. It's a u-stream channel called The High Definition Earth Viewing (HDEV) Experiment. The HDEV Experiment aboard the ISS consists of many HD video cameras aimed at the earth. They are housed in pressure and temperature-controlled housings. This website streams their live video footage. Also seen on the webpage, is an ISS tracker with maps. You can see where the ISS is at the current moment - both in a zoomed-in and zoomed-out view. http://www.ustream.tv/channel/iss-hdev-payload

In his book, astronaut Kelly describes many other experiments that take place on the ISS. My take-aways from reading his book were many! Too many to write about here – and I don't want to spoil your own reading experience! I'll share just a few highlights in the hopes that you will read it yourself!

The ISS is essentially a large, high-tech, research lab that circles our planet every 90 minutes (that's about 16 times in a 24-hour period). 16 countries are involved in either building and/or operating the station. Canada's main contribution to the ISS is the Mobile Servicing System which consists of the Canadarm2, Dextre, and a Mobile Base, all essential in ISS operations. (These were developed by a company in Brampton, Ontario!)

Experiments on the ISS range from growing vegetables to testing human blood. Lab mice even spend time on the ISS so that we can learn more about the impact of weightlessness. One potential impact of weightlessness seems to be its impact on vision. It seems to affect male astronauts more than female astronauts. It's thought that the lack of gravity in space allows fluid to rise more easily in our bodies. This could put pressure on our brains and the retinal nerve. This is being investigated further. There are many things that gravity does for us that we take for granted!

Another interesting aspect of being on the ISS, is that what you breathe out stays on the ISS. CO_2 levels always need to be monitored and managed. The more astronauts on board the ISS, the more CO_2 there is.

Astronaut Kelly also happens to be an identical twin, so some experiments included his twin down here on earth as a comparator.

(Continued on page 12)

Endurance: A Book About Life Off Earth (continued)

Kelly describes his experiences with launches and returns to Earth. In Canadian Astronaut Chris Hadfield's book, *An Astronaut's Guide to Life on Earth*, (another book to read!), returning to Earth is described as: "It's like being a newborn, this sudden sensory overload of noise, color, smells and gravity after months of quietly floating, encased in relative calm and isolation. No wonder babies cry in protest when they're born."

I encourage you to learn more about the amazing ISS. Learning about life off earth can really teach us a lot about life on earth.

Credits:

Hadfield, Chris. *An Astronaut's Guide to Life on Earth: What Going to Space Taught Me about Ingenuity, Determination and Being Prepared for Anything*. Back Bay Books, 2015.

Kelly, Scott. *Endurance: A Year in Space, A Lifetime of Discovery*. Knopf Doubleday Publishing Group, 2017.

https://www.canada.ca/en/space-agency/news/2016/01/canada-and-the-international-space-station.html

Treasurer's Report by Ann Tekatch

Treasurer's Report for November 2018 (Unaudited)

Opening balance:	$8,385.57 *
<u>Revenue:</u>	
50/50 Draw:	$53.50
Memberships:	$510.00
Calendar sales:	$1,500.00
<u>Expenses:</u>	
Calendar Printing:	$2,245.90
Software to create calendars:	$94.64
PayPal Fees:	$5.29
Closing Balance:	$8,103.24

* Corrected from October report to include March 2018 donation of $35 and June 2018 speaker's honorarium of $50.

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.org to find local clubs, events, and more!

Observe Apollo 8's Lunar Milestones

By David Prosper

December marks the 50th anniversary of NASA's Apollo 8 mission, when humans first orbited the Moon in a triumph of human engineering. The mission may be most famous for "Earthrise," the iconic photograph of Earth suspended over the rugged lunar surface. "Earthrise" inspired the imaginations of people around the world and remains one of the most famous photos ever taken. This month also brings a great potential display of the Geminids and a close approach by Comet 46P/Wirtanen

You can take note of Apollo 8's mission milestones while observing the Moon this month. Watch the nearly full Moon rise just before sunset on December 21, exactly 50 years after Apollo 8 launched; it will be near the bright orange star Aldebaran in Taurus. The following evenings watch it pass over the top of Orion and on through Gemini; on those days five decades earlier, astronauts Frank Borman, Jim Lovell, and Bill Anders sped towards the Moon in their fully crewed command module. Notice how the Moon rises later each evening, and how its phase wanes from full on Dec 22 to gibbous through the rest of the week. Can you imagine what phase Earth would appear as if you were standing on the Moon, looking back? The three brave astronauts spent 20 sleepless hours in orbit around the Moon, starting on Dec 24, 1968. During those ten orbits they became the first humans to see with their own eyes both the far side of the Moon and an Earthrise! The crew telecast a holiday message on December 25 to a record number of Earthbound viewers as they orbited over the lifeless lunar terrain; "Good night, good luck, a merry Christmas and God bless all of you - all of you on the good Earth." 50 years later, spot the Moon on these holiday evenings as it travels through Cancer and Leo. Just two days later the astronauts splashed down into the Pacific Ocean after achieving all the mission's test objectives, paving the way for another giant leap in space exploration the following year.

The Geminids, an excellent annual meteor shower, peaks the evening of December 13 through the morning of the 14th. They get their chance to truly shine after a waxing crescent Moon sets around 10:30 pm on the 13th. Expert Geminid observers can spot around 100 meteors per hour under ideal conditions. You'll spot quite a few meteors by avoiding bad weather and light pollution if you can, and of course make sure to bundle up and take frequent warming breaks. The Geminids have an unusual origin compared to most meteor showers, which generally spring from icy comets. The tiny particles Earth passes through these evenings come from a strange "rock comet" named asteroid 3200 Phaethon. This dusty asteroid experiences faint outbursts of fine particles of rock instead of ice.

(Continued on page 14)

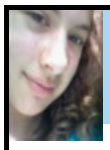
NASA Night Sky Notes (continued)

You can also look for comet 46P/Wirtanen while you're out meteor watching. Its closest approach to Earth brings it within 7.1 million miles of us on December 16. That's 30 times the average Earth-Moon distance! While passing near enough to rank as the 10th closest cometary approach in modern times, there is no danger of this object striking our planet. Cometary brightness is hard to predict, and while there is a chance comet 46P/Wirtanen may flare up to naked eye visibility, it will likely remain visible only via binoculars or telescopes. You'll be able to see for yourself how much 46P/Wirtanen actually brightens. Some of the best nights to hunt for it will be December 15 and 16 as it passes between two prominent star clusters in Taurus: the Pleiades and the V-shaped Hyades. Happy hunting!

Catch up on all of NASA's past, current, and future missions at nasa.gov

Caption: Earthrise, 1968. Note the phase of Earth as seen from the Moon. Nearside lunar observers see Earth go through a complete set of phases. However, only orbiting astronauts witness Earthrises; for stationary lunar observers, Earth barely moves at all. Why is that?

Credit: Bill Anders/NASA



Cartoon Corner by Alexandra Tekatch

"I hate aperture fever!"

Eye Candy the Members' Image Gallery

Sunset "Keyhole", by **Denise White**
Taken from Hamilton, ON, with her Canon PowerShot A 1400 camera. 1/40 second at f/6.9 & ISO 400.

William J. McCallion Planetarium

McMASTER UNIVERSITY, HAMILTON, ONTARIO

- **Public shows every Wednesday (7:00pm)**
- **Public transit available directly to McMaster campus**
- **Tickets $7 per person; private group bookings $150**
- **Different shows every week**
- **Upcoming shows include:**

  – **Dec 5: Introductory Astronomy for Kids - Galaxies**

- **For more details, visit**
  www.physics.mcmaster.ca/planetarium

UPCOMING EVENTS

December 14, 2018 - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium. Our featured speaker will be **Francois van Heerden**. His talk is entitled *"Mallincams: For Outreach and Observing in Light-Polluted Areas"*. This meeting is our Christmas Social (see announcement on Page 4).

January 11, 2019 - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium.

2018-2019 Council

Chair	John Gauvreau
Second Chair	Mike Jefferson
Treasurer	Ann Tekatch
Digital Platforms Director	Christopher Strejch
Membership Director	Leslie Webb
Observing Director	Steve Germann
Education Director	Jo Ann Salci
Event Horizon Editor	Bob Christmas
Recorder	Matthew Mannering
Secretary	Jim Wamsley
Publicity Director	Mario Carr
Councillors at Large	Brenda Frederick Denise White Dee Rowan Gary Sutton Sue MacLachlan Barry Sherman Bernie Venasse

Check out the H.A.A. **Website**
www.amateurastronomy.org

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Public Events:
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