Event Horizon

Volume 26, Number 7
May 2019

From The Editor

Here we are in May, and Spring is setting in a little more, one bit at a time.

Here's hoping this brings more comfortable observing conditions.

Clear Skies!

Bob Christmas, Editor

editor 'AT' amateurastronomy.org

Chair's Report by John Gauvreau

I am looking forward to one of my favourite astronomical traditions; the summer star party season is nigh! At the end of this month, along with several other HAA members, I am off to one of the first of the season, at Cherry Springs State Park in Pennsylvania. There are lots of observers, telescopes, presentations, vendors and hopefully clear, dark skies over the few days of the party. For those that haven't been to a star party, the idea is that observers gather in a dark location to indulge in a few days of intense astronomy. Usually a dark site means being far from towns and cities, so camping is the norm. Looking across the observing field you see lines of cars, tents and telescopes… cars, tents and telescopes. It's a lot of fun meeting other people and having a look through their telescopes. Last year I got to have a look through a 32" reflector equipped with Al Nagler's electronically assisted eyepiece (yes, that Al Nagler, who is a frequent visitor and always happy to talk and observe with you). I saw M16, the Eagle Nebula, and not only were the famous Pillars of Creation visible, but the view was so detailed that I could easily see the bridge that connects the second and third pillar. It was amazing! And it's

(Continued on page 2)

IN THIS ISSUE:

Chair's Report (continued)

a lot of fun spending time with some great people from the HAA. You can't beat good company and good observing. This is just the start of the season and there will be several other nearby star parties coming up. I very much recommend you try one out.

This has been a busy month for the HAA and it began at our last meeting with guest speaker Stephen Holmes. Steve is President of the Kitchener Waterloo Centre of the RASC and he gave a very engaging talk about how SETI can teach us a lot about astronomy. For the 92 people in attendance it was a great night with lots going on. Steve Germann gave a great Sky This Month talk, Denise White showcased another fine library book, and Tyler O'dell, winner of the HAA award at BASEF, was in attendance. And a big thank you to Kevin Salwach for the donation of a special door prize (yes, somebody went home with a nice eyepiece!)

Also at the meeting, we unveiled the opportunity to purchase HAA emblazoned apparel. Tee shirts, polos and hoodies all sporting a wonderful design provided by Sue McLaughlin, courtesy of the artistic talents of her niece. For a reasonable price you could be sporting some club clothing at an upcoming public event (or anywhere else!). You can see the new apparel for yourself at this meeting coming up on May 10th.

This month will have Alanna Mitchell, author of 'The Spinning Magnet' as our guest speaker. This timely and topical presentation about the Earth's magnetic field should be really interesting. It's a great opportunity to meet this author right here in Hamilton!

This past month we also had a great public observing night at Bayfront Park. Lots of HAA members armed with telescopes of all types filled the median in the parking lot on a mild and fairly clear night. Lots of members of the public enjoyed views of the first quarter moon and lively conversation. So glad to have a clear night so early in the season! The next event is May 11 at McQuesten Park, 1199 Upper Wentworth St, Hamilton. Just south of Limeridge Mall, this has been a favourite viewing location for many years. Come on out at dusk for some great views and visiting. Bring a telescope to share with others and bring your friends and family. These are really fun nights.

Our education director, Jo Ann Salci, spearheaded two outreach events this past month. The first, a Scouting camp, saw Jo Ann, myself, Matthew Mannering and Leslie Webb entertaining Beavers, Cubs and Scouts with a variety of astronomical presentations. All gave a stellar effort, although Les gave just a little more of himself that night. While packing up in the dark (the very, very dark!) Les took a spill over a particularly high curb while carrying his scope back to the car. The scope fared better than Les, who requited some first aid. A thank you to all who go above and beyond for the public good. The second saw

(Continued on page 3)

Masthead Photo: *The Pinwheel Galaxy (M101), by Peter Wolsley.*

Taken on July 4, 2017, from Sauble Beach, Ontario, with his Nikon D5300 through his 8" Celestron EdgeHD at f/10 (2032mm Focal Length) at ISO 400. Exposures: 15 x 600 seconds, for a total of 2.5 hours. Digitally developed using Startools.

Chair's Report (continued)

Jo Ann, myself, Matthew and Janice Mannering and Jim Wamsley attend Hillfield Strathallen School's first ever Space Expo for their grade 6 classes. This mini science fair was entertaining and hopefully we provided some insight for the students as we engaged them one on one to discuss their projects and research.

There are more outreach events coming up and you can always be a part of it just by asking.

Closer to home, we also opened our doors to the public for our Spring Workshop session. Following up the successful fall workshops on telescopes and astronomical equipment, this set of mini talks focused on observing. Matthew, Steve, Les and Bernie Venasse all gave great presentations and Jim enthralled the visitors with a wonderful meteorite display.
Finally, I want to say a few words about long time member Harvey Garden. Harvey was a member of council for a number of years, an amateur telescope maker and a pleasant and cheerful presence at many meetings and events. Sadly, Harvey passed away last week after a long illness. Harvey and I lived in the same part of the city and often rode home together after meetings. These rides were always a nice opportunity for some quiet conversation that often wandered far outside of astronomical topics but always included his wry humour. For all we learn about astronomy through a club like ours, the greatest benefit is getting to know the other members and enjoying their good company, and Harvey was always good company.

As always, feel free to get in touch (council emails are on the last page of the newsletter) and see you out there.

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.

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 Food Share
Hunger. It's just unacceptable.

Congratulations to *Tyler O'dell*, the 2019 Jim Winger Award Winner!

Tyler shows a presentation of his winning BASEF astronomy project at the HAA Workshop, April 20, 2019.

Image Credit: Bob Christmas

Programming Alert

Documentary: IMPOSSIBLE ENGINEERING

Episode 12:

The Five-hundred-meter Aperture Spherical Telescope, or FAST, is the largest and most sophisticated radio telescope on the planet.

48 minutes

Available to watch on TVO online until May 31st, 2019:

https://www.tvo.org/video/documentaries/ep-12-fast-five-hundred-metre-aperture

— *David Simpson*

Letter to the Editor

I'm attaching this note to the two accompanying photos taken on June 14, 1967 in Armagh, North Ireland (about 41 miles southwest of Belfast). I was traveling around the British Isles and Europe for the summer and reached Armagh about two weeks into the trip.

I was strolling about the Armagh observatory when I caught sight of a beautiful 5 1/2" brass telescope and asked someone if I could take a photo of it. He said "yes", so I picked it up and carried it over to the ledge of a 15-ft high wall of the observatory and balanced it precariously there for the photograph. The gentlemen said, "Be careful! That telescope belonged to George III (1738-1820)". I then quickly and cautiously returned it to its shelf. George (or as he was later known, Mad George), was King of England from 1760 until 1820.

I chatted with the fellow, who had cautioned me, and told him about my interest in astronomy. He invited me to accompany him, his mama and his secretary to lunch at "The Club"! I found out I was dining with *Patrick Moore*.

Later, at his home, he gifted me with one of the 50 books he had published to that date entitled "The Craters of the Moon". Patrick and I exchanged Christmas cards for a couple of years.

Patrick Moore was the interim Director of the Armagh Observatory, overseeing the construction of the planetarium, which opened May 1, 1968. He was knighted by the Prince of Wales in 2001.

He passed away on December 9, 2012.

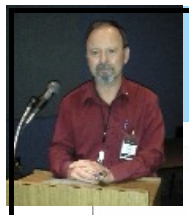
Thanks for everything Patrick!

- Jim Rose, Hamilton ON

above right: Armagh Observatory.

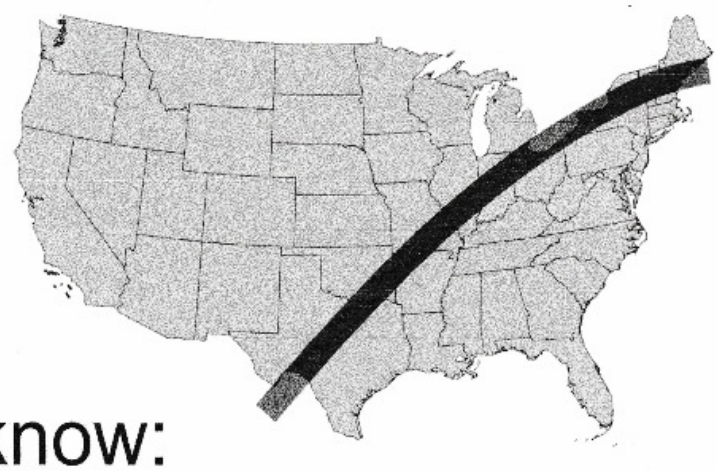
lower right: King George III's Telescope.

Photo Credit: Jim Rose (both)



April 8, 2024 Solar Eclipse Planning by Bernie Venasse

What are your plans for viewing the 2024 Solar Eclipse?



Let me know:

eclipse@amateurastronomy.org

Hamilton Amateur Astronomers

April Astrophysics Group Meeting Summary by Mike Jefferson

April 26/2019: The Astrophysics Group held its April, 2019 meeting at the home of Doug Black. Present were Doug Black, Doug Currie, Gary Sutton, Ian Rabende, Mike Jefferson and three new attendees. They are David Brewer, Lynn Jones and and Eva Sthorer. The topic under consideration was "Black Holes", with much reference to the "Event Horizon Telescope" and its black hole images because that topic has been so much in the newspaper and other publications headlines over the last few weeks. Doug Currie was the main presenter but had to modify his presentation due to the lack of A/V equipment because of a member absence. Despite that, everything went off very well.

Mike Jefferson started the meeting by reading and discussing articles from "The Hamilton Spectator", "The Toronto Sun", "The Guardian" and with references to "Nature" and "Wikipedia". He also brought a DVD with a working model of a black hole and the behaviour of the stars in its neighbourhood. This was run on Doug Black's computer for all to comment on and analyze.

Doug Currie then presented his 'PowerPoint' dissertation from his notes, as we could not get it to run on any of the computer equipment we had with us. He posed some very interesting questions for all of us to consider.

Finally, *Gary Sutton* led a round-robin discussion on a number of cosmological concepts, which provided much food for thought.

The research with the "Event Horizon Telescope" has been carried on with interferometric radio frequencies using a group of 8 radio instruments located in Antarctica, Chile, Spain and other locales around the world. This generates a telescope as big as the Earth. This was necessary because the black hole image is no bigger than a piece of citrus fruit on the Moon. All of this is timed and coordinated by masers or atomic clocks and involved the work of more than 200 scientists, including Avery Broderick, an astrophysicist at the University of Waterloo.

We enjoyed a very productive and participatory meeting. Again our thanks to the Blacks for their hospitality and delicious refreshments. Gary Sutton was kind enough to bring along some 'nibbles', as well.

Our next meeting has been slated for *May 17, 2019*, a week after the HAA General Meeting on May 10, 2019. Watch the website for any possible changes.

Treasurer's Report by Ann Tekatch

Treasurer's Report for April 2019 (Unaudited)

Opening balance:	$9,267.95
<u>Revenue:</u>	
50/50 Draw:	$86.00
Membership Fees:	$50.00
Donation:	$100.00
T-Shirt Orders:	$560.00
<u>Expenses:</u>	
Loaner Scope (Meade ETX90) purchase:	$75.00
PayPal Fees:	$2.06
Speaker Honorarium:	$50.00
Receipt Book:	$18.07
Closing Balance:	$9,918.82

The Sky This Month for May 2019 by Bob Christmas

I bet you are surprised to see my name and picture here this month, instead of Steve's. But due to a personal emergency, Steve had to take a break from writing The Sky This Month this time, so, I'm stepping in this month.

What I will do is cover the Moon, the Planets, etc., and synopsize a few events happening this May.

The Moon

Phases this month:

- May 4 22:45 UT — New Moon
- May 12 01:12 UT — 1st Quarter
- May 18 21:11 UT — Full Moon
- May 26 16:34 UT — Last Quarter

The Planets

- *Mercury* starts the month in the morning sky, but gets lost in the Sun's glow mid-month before passing superior conjunction and re-appearing in the evening sky just before month end.
- *Venus* is in the morning sky, gradually losing apparent distance between itself and the Sun.
- *Mars* is in the evening sky, gradually losing apparent distance with the Sun, being at about 40 degrees elongation at the start of the month, dropping to 30 degrees elongation by month end.
- *Jupiter* rises after midnight, towards the constellation Ophiuchus, but is getting more prominent and more accessible as it approaches opposition on June 10.
- *Saturn* rises in the morning sky later than Jupiter, in Sagittarius.
- *Uranus* re-appears in morning twilight in the second half of the month.
- *Neptune* is in the morning sky in the constellation Aquarius.

Minor Planets

- *Ceres* is in ideal position in the May sky this year, in the constellation Ophiuchus, just above the bright star Antares and the constellation Scorpius. It reaches opposition on May 28 23:00 UT.
- *Vesta* is in the evening sky, closing in on the Sun, and will have 2 close passes by the Moon (see Significant Events below).

Comets

Unfortunately, no bright comets are visible right now. The brightest comet in the sky at time of writing, according to the Heavens Above website, is *C/2018 Y1 Iwamoto*, which is very faint at magnitude 12.5 and fading. You will need a large telescope and a dark sky to see it. It is located in the constellation Perseus.

(Continued on page 9)

The Sky This Month for May 2019 (continued)

Timeline of Significant Events

- May 2 — Vesta 0.2 degrees south of the thin crescent Moon.
- May 5 — h-Aquarid Meteors peak.
- May 8 — Mars 3 degrees north of the thin waxing crescent Moon.
- May 11 — Moon in Beehive Cluster (M44).
- May 19 — Ceres 1.2 degrees north of the Moon.
- May 20 — Jupiter 1.7 degrees south of the Moon.
- May 23 (early morning) — Saturn 0.5 degrees north of the Moon. Later, Pluto 0.1 degrees north of Moon.
- May 28 — Ceres at opposition.
- May 31 — Vesta 0.6 degrees south of the thin crescent Moon. Later, Uranus 5 degrees north of the Moon.

On behalf of Steve Germann, clear skies.

Sources

- The Royal Astronomical Society of Canada. *Observer's Handbook 2019*. Editor: James S. Edgar. Toronto, ON, 2018. pp. 106, 107.

- The Heavens Above website; https://www.heavens-above.com

Positions of Saturn, Jupiter and Ceres in Sagittarius, Ophiuchus and Scorpius in the Summer Milky Way on May 15, 2019 at 3:21:40 EDT from Hamilton, ON.

Chart generated using Stellarium.

Deep Sky Stacker Background Calibration and the Superposition of Light by Peter Wolsley

It is accepted best practice to always take Deep Sky Object (DSO) astrophotos once the sky has fully darkened. I know that astrophotos, also called LIGHT frames, that are taken just prior to total darkness contain visible stars so I decided to study how the sky brightness affects the data recorded by my Nikon D5300 DSLR.

I did some research on the web about light and found the following description of the "Superposition of Lights".

"If the component waves of a beam of light of a single frequency have a fixed phase relationship with each other, the light is coherent (e.g., the laser). Two beams of light are coherent if the phase difference between their waves is constant. For example, two beams produced by splitting a single laser beam are coherent and they form stable interference patterns when combined. On the other hand, a light is non-coherent if its component waves have a random or changing phase relationship, such as light produced by an incandescent light bulb.

The intensities of incoherent lights add linearly, i.e., the spectral energy distribution of the mixture of two lights is the linear combination of their individual energy distributions."

Ruye Wang 2013-09-25

It's my understanding that the sky brightness caused by twilight, the moon or by light pollution can be described as incoherent sources of light. In many LIGHT frames these three sources of light can exist and can vary over the course of the evening as multiple LIGHT frames are acquired. The light from a DSO or a star is also incoherent light so all of these sources of light add linearly to the data recorded by my DSLR. In order to create high quality astrophotos we need to combine multiple individual LIGHT frames in a process called stacking. This process identifies where stars are located in each LIGHT frame and shifts the data so that all of the stars line up. This shifting of the data is called "registering". I use a program called Deep Sky Stacker (DSS) to perform this stacking function. DSS has a feature called Background Calibration which attempts to cater for twilight, moon and light pollution variations between LIGHT frames.

I decided to conduct a test so that I can see what Deep Sky Stacker's background calibration does.

When DSS performs a stacking operation it will choose one of the LIGHT frames as the reference frame. All the adjustments to the other LIGHT frames will be to align them to this reference frame. The background calibration process is described as a "Normalization" which effectively sets the dark sky background to the same value, as in the reference frame, in each LIGHT frame. There are two background calibration methods which are described as follows:

Per Channel Background calibration

The median values are determined for the red, green and blue (RGB) channels of the reference frame. The RGB channels of the other LIGHT frames are adjusted so that their RGB median values are the same as the reference frame. This makes the RGB histograms for all of the LIGHT frames share the same peak or median values for each channel. The RGB data is also "Normalized"…more on this later.

RGB Background calibration

The median values are determined for the RGB channels of the reference frame. The user specifies the option to use the lowest, highest or middle median value as the master median value. All LIGHT frames are then adjusted so that all RGB channels share this same master median value. This makes the RGB histograms for all channels of all of the LIGHT frame share the same peak or median value. This can produce washed out or grey images. The RGB data is also "Normalized".

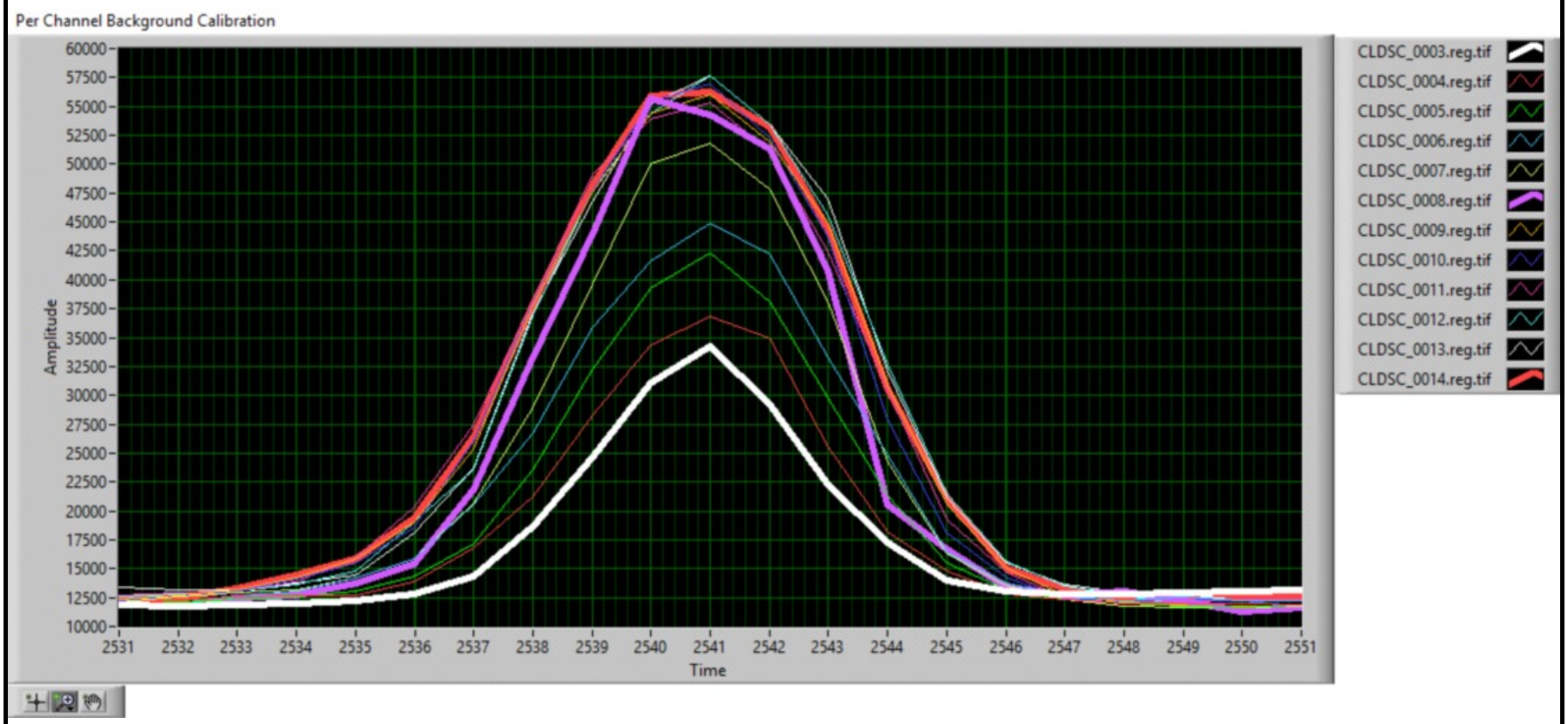
Deep Sky Stacker Background Calibration and the Superposition of Light (continued)

Background information about me

I have developed a program that creates master DARKs, FLATs, BIAS etc. and also can calibrate my LIGHT frames and save them as 16 bit tiffs. My program multiplies the resulting RGB values by 4 so that the resulting tiff files contain RGB data that ranges from 600 to 65,535. All of the processing is done using floating point math. My program uses a third party program called DCRAW to extract the pixel data from the DSLR RAW files (*.nef) and avoids white balancing the data. The end result is that I have better control of how my LIGHT frames are calibrated and still use Deep Sky Stacker to stack my LIGHT frames while avoiding any white balancing of the data. I use a program called Startools to perform the final tweeking of my astrophotos. Startools performs best if the data is not whitebalanced. Startools also asks users to avoid using DSS background calibration or any processing that normalizes the data.

On July 6th, 2018 I decided to image the Cat's Eye Nebula. This was a huge mistake because the Cat's Eye Nebula is incredibly small and all I got was a small blob surrounded by stars. I decided that night to get my system taking pictures as soon as possible which was ½ hour after civil sunset. The sky was still bright but the stars were visible. I decided to use the resulting calibrated 4 minute LIGHT frames to conduct this test.

I threw out the first few LIGHT frames and studies the next 12 light frames. I initially had DSS stack the LIGHT frames and found that CLDSC_0008.D.tiff was chosen as the reference LIGHT frame. I then examined CLDSC_0008.D.tiff and found a small star that was not saturated. I then wrote a program that would display the green channel pixel data for the specific scanline in the tiff file where this small star can be found. I then zoomed in to a small region of roughly 20 pixels in that scanline.



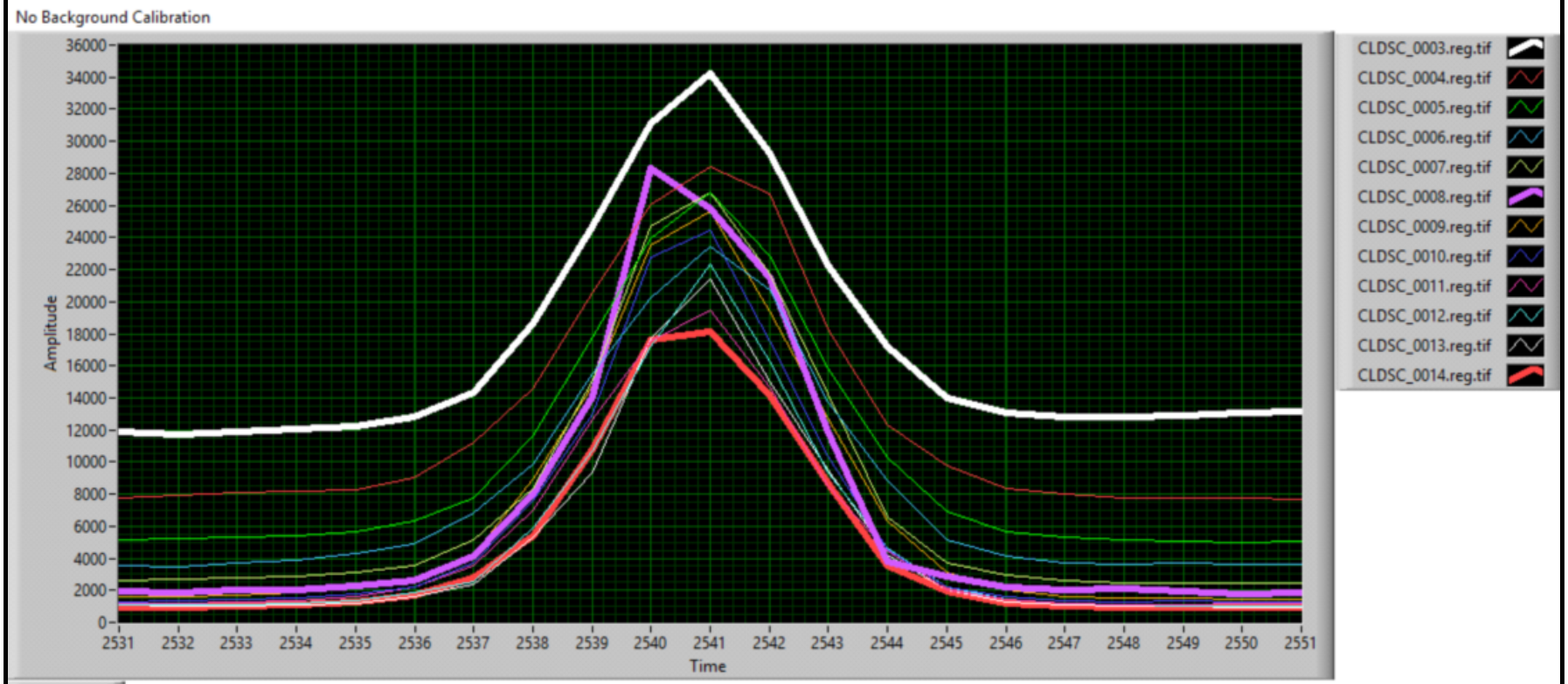
The Y axis is the value of the green pixel. The X axis is the pixel offset from the left edge of the photo. Please ignore the "Time" axis label.

This graph contains the green pixel data for all twelve LIGHT frames for the exact same pixel location in the image. None of the pixel values in this location are saturated. Because the images are not aligned the star only shows up strongly in CLDSC_0008.D.tiff. The earliest image [CLDSC_0003.D.tiff thick white pen] clearly shows that the sky background is quite brighter than the other LIGHT frames. The next LIGHT frames show the sky darkening. The reference frame [CLDSC0008.D.tiff thick purple pen] shows that the sky background had almost completely finished darkening. The last LIGHT frame

Deep Sky Stacker Background Calibration and the Superposition of Light (continued)

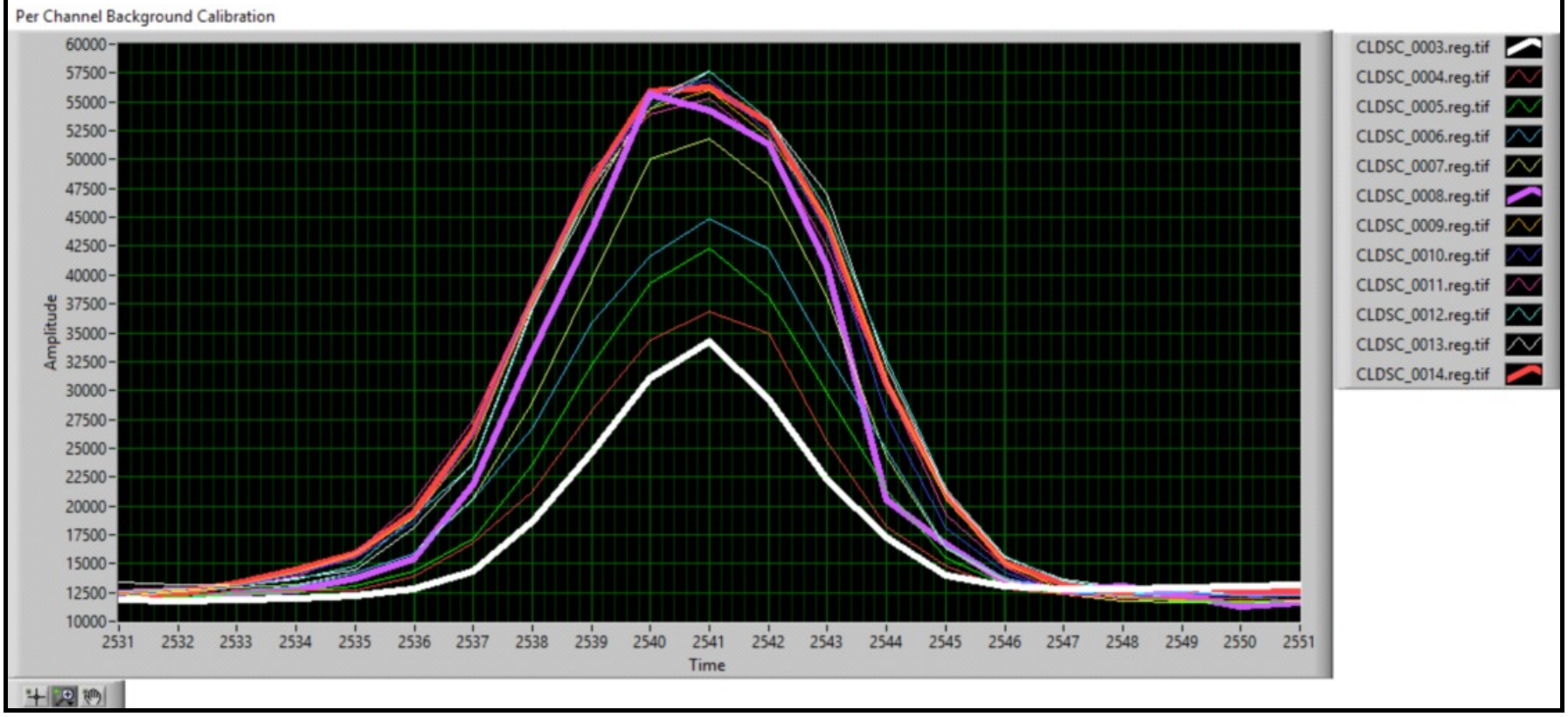
[CLDSC0014.D.tiff thick red pen] shows the sky background had reached it's darkest point for the evening.

The first test I wanted to perform was to prove that if I tell DSS to not perform any background calibration that it will just register all of the photos. DSS has an option to generate registered images for each light frame. I had DSS do exactly this and then I graphed the exact same pixel locations only this time using these registered images.



This graph confirms that DSS has done a pretty good job of aligning the images so that the star appears in the same location in all 12 registered LIGHT frames. This graph also confirms that DSS didn't alter the data for CLDSC_0008.reg.tiff.

So far so good… Now I told DSS to perform per channel background calibration and also generate registered images for each LIGHT frame.



Deep Sky Stacker Background Calibration and the Superposition of Light (continued)

Wow! I didn't expect this result. This is a good news and bad news event. The good news is that the sky background for all of the images are now the same. The bad news is that all of the values were subjected to a "normalization" that dramatically altered the data. I would have thought that the values for CLDSC_0008 would not have changed. Instead, the sky background of roughly 2000 has changed to 12,500. The peak value has jumped up from 28,000 to 55,500.

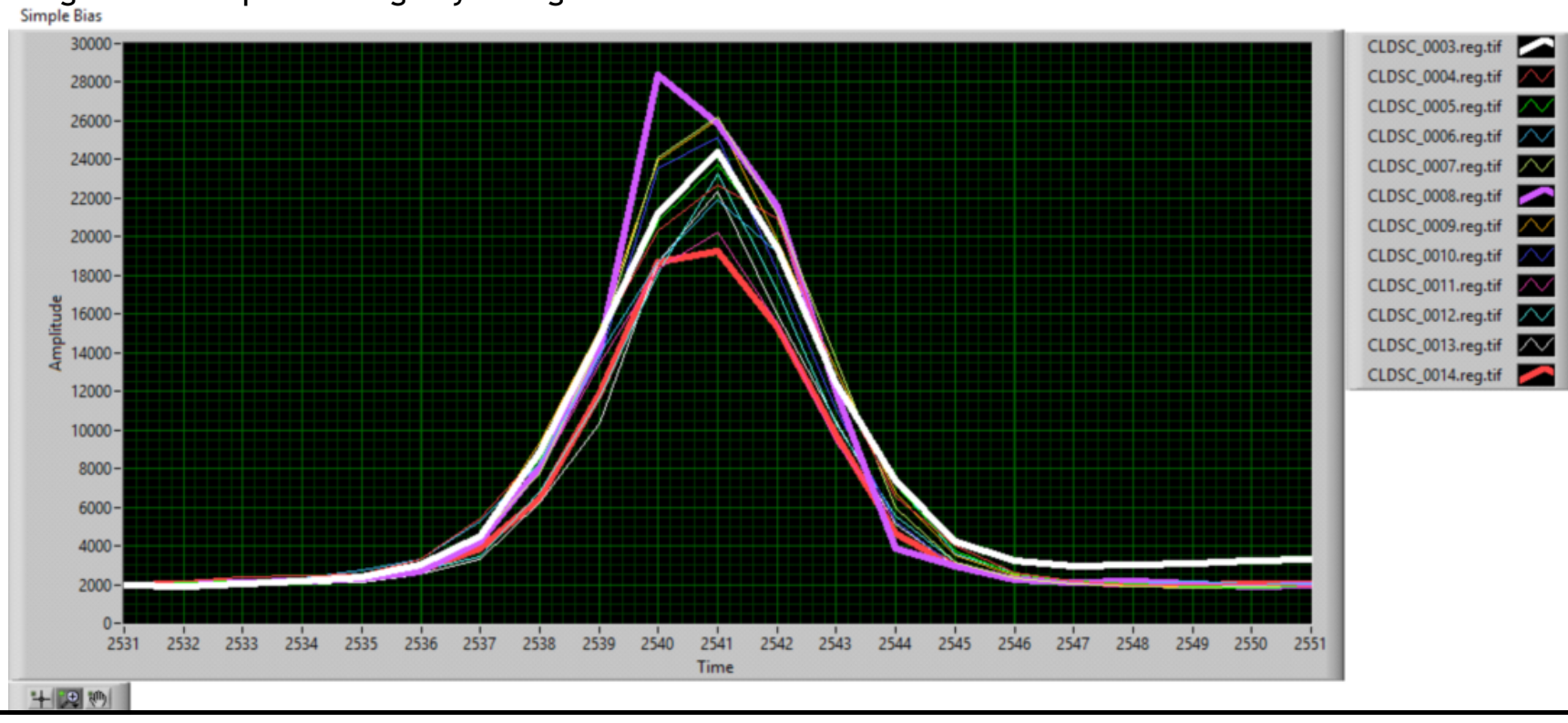
I didn't bother seeing what the RGB background calibration looks like. I suspect it will look pretty much the same. The DSS documentation says that Per Channel background calibration is a good idea if you are using Kappa Sigma stacking algorithms. I suspect that is only valid if the sky background in all images are virtually same to begin with.

If you look back at the "No Background Calibration" graph you can clearly see that the star profile in every LIGHT frame looked pretty much the same. Using DSS background calibration resulted in huge differences between the star profiles which will certainly affect what pixel values get rejected when DSS uses it's Kappa Sigma stacking method.

I didn't like this result so I decided to invent my own version of sky background compensation. I took the approach that there are two light sources at play here. The most important being the star and the least important being the sky background. I also made the assumption that the photons from two light sources simply add together as per the "Superposition of Lights" theory. The combined stream of photons enter into my camera to generate electrons in my imaging chip which get converted to count values and stored in my DSLR's LIGHT frames.

I also took the position that most astrophotos are dominated by pixels representing the sky background. To me, this meant that the mean value of all of the red pixels represents the sky background for red, for this LIGHT frame. Mean values for green and blue pixels can also be determined. Finally, I made it possible for me to specify which LIGHT frame should be used to determine reference frame mean values for red, green and blue pixels. Then, I altered my program so that it would add or subtract an offset for each pixel color, for each LIGHT frame so that ALL of the calibrated LIGHT frames contained the same mean values for their red, green or blue pixels as does the reference frame. I also chose to NOT perform any "normalization" of the data.

I regenerated my calibrated LIGHT frames using this approach and then had DSS regenerate registered images without performing any background calibrations.



Through the Looking Glass by Greg Emery

Despite the best of intentions, I am still not able to find the time in my life to write a regular column for the EH. It must be due to being busy with “everything”; it surely cannot be due to my aging and falling asleep watching TV in the evening.

Life always seems to carry you back to where you want to be. It’s oftentimes a circuitous route. This summer promises to be a summer of astronomy for me. I had mentioned previously that I will be spending weekends in the summer at Gordon’s Park on Manitoulin Island helping with their astronomy outreach. I look forward to that but more so I am looking forward to the amazingly dark skies that are available there.

The astronomy is not limited to the public outreach portion. There are also two star parties and two Aurora Borealis Weekends on the schedule. The weekends of May 24-26 and August 30 to September 3 are the Aurora Borealis Weekends. The May event is essentially a 3rd quarter moon, so the skies will be sufficiently dark for some good observing in addition to hopefully catching a glimpse of some aurora. The August 30 to September 3 weekend is a new moon, and in addition to the possibility of seeing an aurora display, we will have some very dark skies. In the past I have been viewing in the Dark Sky Preserve at Gordon’s Park when we had an aurora. The first twenty minutes of nature’s light display were beautiful. After a while, I began to get a little annoyed – the aurora was bright enough and extended pretty much to the zenith, obscuring my viewing plans. Although if your plans for the night are going to be ruined/changed, what better reason than a bright Aurora Borealis?

The two star parties are the weekends of June 28- July 1 (Stargazing Manitoulin) as well as August 9-13 (Perseids Meteor Party). I have always had an enjoyable time at the star parties that I have attended. There is a smaller, more intimate nature to the events here as compared to StarFest or one of the events south of the border. There is typically a nice mix of experience, equipment and people. Visual observers and astrophotographers are equally represented. The Stargazing Manitoulin Weekend falls pretty much on the new moon. The Perseids Star Party falls between a first quarter and full moon. The pre-dawn skies should be nice. The moon will set between 1am and 2:30 am depending on the day, which still leaves ample time for dark sky viewing. Hopefully I’ll see some of you there!

More information is available at:

https://www.gordonspark.com/astronomy/

Deep Sky Stacker Background Calibration and the Superposition of Light (continued)

I think this might be a better solution. The star profiles now look much closer and the sky backgrounds are also closer. With this method, I believe that when DSS performs it’s Kappa Sigma stacking that, pixel by pixel, the values used will all have much smaller standard deviations. This should result in stacked images that have lower noise. I believe that this will be a better solution for imaging on moon lit nights or nights where the sky background changes due to commercial/urban lighting cycling on or off. I have posted my findings on the Startools forum but have not received any replies.

NASA Night Sky Notes

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

Watching the Late Spring Skies

By David Prosper

Late spring brings warmer nights, making it more comfortable to observe a good showing of the **Eta Aquarids** meteor shower. Skywatchers can also look for the delicate **Coma Star Cluster**, and spot the **Moon** on the anniversary of **Apollo 10**'s "test run" prior to the Moon landing in 1969.

The **Eta Aquarids** meteor shower should make a good showing this year, peaking the morning of May 6. This meteor shower has an unusual "soft peak," meaning that many meteors can be spotted several days before and after the 6th; many may find it convenient to schedule meteor watching for the weekend, a night or two before the peak. You may be able to spot a couple dozen meteors an hour from areas with clear dark skies. Meteors can appear in any part of the sky and you don't need any special equipment to view them; just find an area away from lights, lie down on a comfy lawn chair or blanket, relax, and patiently look up. These brief bright streaks are caused by Earth moving through the stream of fine dust particles left by the passage of Comet Halley. While we have to wait another 43 years for the famous comet grace our skies once more, we are treated to this beautiful cosmic postcard every year.

While you're up meteor watching, try to find a delightful naked eye star cluster: the **Coma Star Cluster** (aka Melotte 111) in the small constellation of Coma Berenices. It can be spotted after sunset in the east and for almost the entire night during the month of May. Look for it inside the area of the sky roughly framed between the constellations of Leo, Boötes, and Ursa Major. The cluster's sparkly members are also known as "Berenice's Hair" in honor of Egyptian Queen Berenices II's sacrifice of her lovely tresses. Binoculars will bring out even more stars in this large young cluster.

May marks the 50th anniversary of the Lunar Module's test run by the A**pollo 10** mission! On May 22, 1969, NASA astronauts Thomas Safford and Eugene Cernan piloted the Lunar Module - nicknamed "Snoopy" - on a test descent towards the lunar surface. Undocking from "Charlie Brown" - the Command Module, piloted by John Young – they descended to 47,400 feet above the surface of the Moon before returning safely to the orbiting Command Module. Their success paved the way for the first humans to land on the Moon later that year with Apollo 11. Look for the Moon on the morning of May 22, before or after dawn, and contemplate what it must have felt like to hover mere

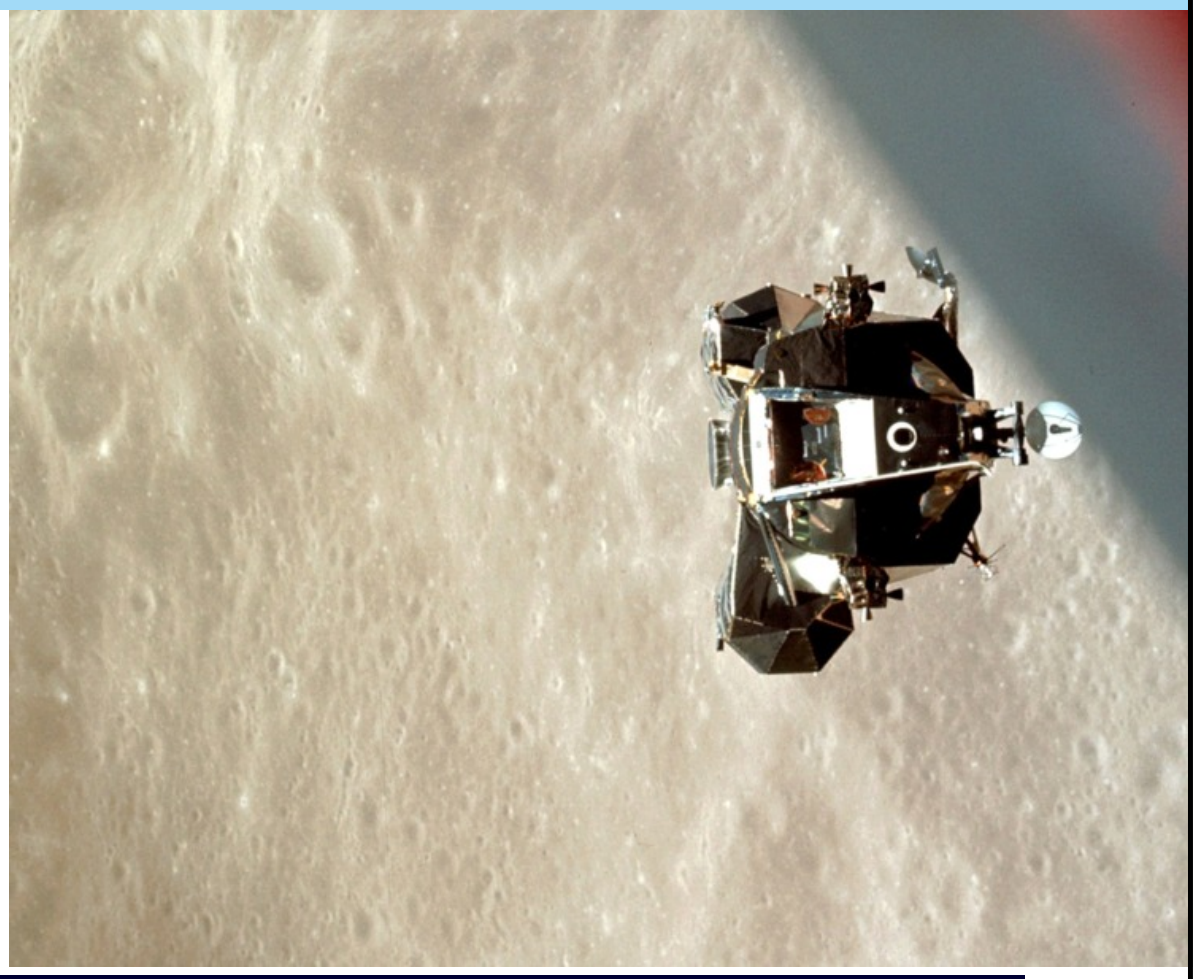
(Continued on page 16)

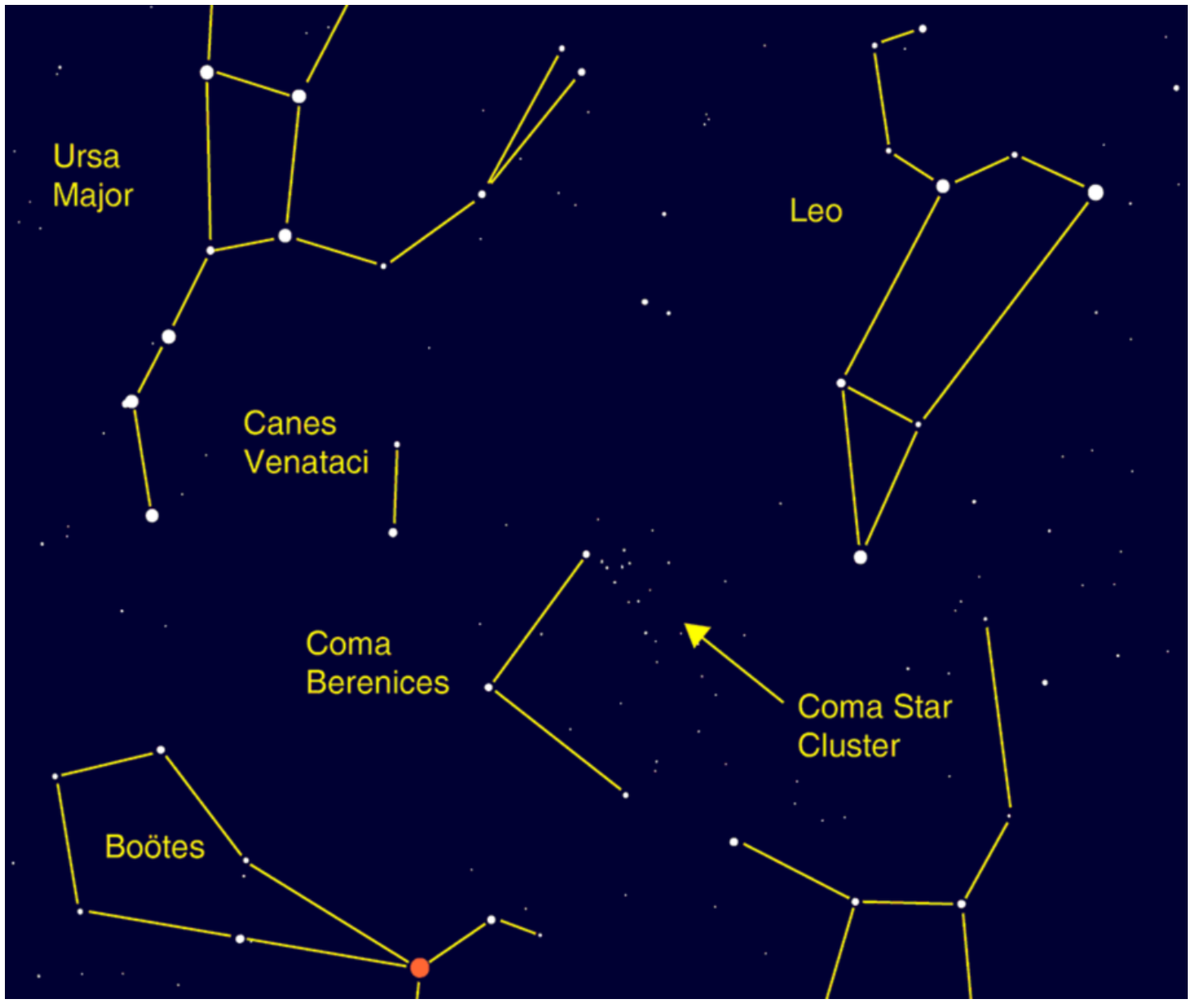
miles above the lunar surface. You'll also see the bright giant planets Saturn and Jupiter on either side of the Moon before sunrise. When will humans travel to those distant worlds?

You can catch up on all of NASA's current and future missions at nasa.gov

Right: A view of Apollo 10's Lunar Module from the Command Module as it returned from maneuvers above the lunar surface.

Photo Credit: NASA
Source: http://bit.ly/apollo10view





Try to spot the Coma Star Cluster! Image created with assistance from Stellarium.

Eye Candy the Members' Image Gallery

Waxing Gibbous Moon (illumination: 58%), April 13, 2019, by **Sylvie Gionet**

H.A.A.'s Public Stargazing Night, April 13, 2019, by **Brent Spencer**

Eye Candy the Members' Image Gallery

Close-Up of Terminator of Waxing Gibbous MoonUp, April 13, 2019, by **John Gauvreau**

For Sale

10" Orion SkyQuest XT10 Dobsonian Telescope

Price: $650.

Great condition, maintained with care. Comes with padded carrying case from the manufacturer.

Located in downtown Hamilton, pickup only.

If interested, please contact ***Kevin Salwach***
Email: kevinstanley3131 ‘AT’ gmail.com
Phone: 365-888-0994

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:**
  - **May 1: Introductory Astronomy for Kids — Solar System**
  - **May 8: Astronomy Through the Ages**
  - **May 15: The Scales of the Universe**
  - **May 22: 50 Years in Space**
  - **May 29: Moons**
- **For more details, visit www.physics.mcmaster.ca/planetarium**

UPCOMING EVENTS

May 10, 2019 - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium. Our featured speaker will be **Alanna Mitchell**. She will talk about her book *"The Spinning Magnet"*.

May 11, 2019 - 9:00 pm - 11:00 pm — *Public Stargazing Night* at McQuesten Park, 1199 Upper Wentworth St, Hamilton, ON.

June 14, 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

Contact Us
Hamilton Amateur Astronomers
PO Box 65578
Dundas, ON
L9H 6Y6

www.amateurastronomy.org

General Inquiries:
secretary@amateurastronomy.org

Membership:
membership@amateurastronomy.org

Meeting Inquiries:
chair@amateurastronomy.org

Public Events:
publicity@amateurastronomy.org

Observing Inquiries:
observing@amateurastronomy.org

Education:
education@amateurastronomy.org

Newsletter:
editor@amateurastronomy.org

Digital Platforms Director:
webmaster@amateurastronomy.org

Observing site for the HAA provided with the generous support of the
Binbrook Conservation Area
Come observing with the HAA and see what a great location this is for stargazing, a family day or an out-door function.
Please consider purchasing a season's pass for $79 to help support the park.
http://www.npca.ca/conservation-areas/binbrook/
905-692-3228

HAA Portable Library Contact Information

E-mail: library@amateurastronomy.org