Event Horizon

Volume 25, Number 9
September 2018

From The Editor

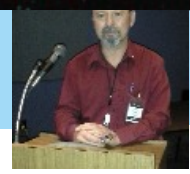
Wow, has Summer 2018 flown by so fast!

I hope you enjoy this first Event Horizon of the new "school year".

Enjoy!

Bob Christmas, Editor

editor 'AT' amateurastronomy.org



Chair's Report by Bernie Venasse

I hope everyone has had a great summer. After a two month break, we are about to start our monthly meetings again.

Some summer events: Our June event was rained out, the July event was clouded-out.

The public Perseid event was attended by over 900 visitors. A great effort was put forward by all the volunteers who handled the masses. Thank you all!!

Lakeland Park was the site of the August Solar and Celestial event. We welcomed several visitors to the Solar portion of the event. I was joined in the evening by several members who brought their scopes Although cloud and smoke obscured the night sky, we managed to get decent views of the moon to show the visiting public.

Our September 14 speaker will be *Kevin Salwach*. Kevin will speak to us about Naked-eye Astronomy.

(Continued on page 2)

IN THIS ISSUE:

- The Sky For September 2018
- Cartoon Corner
- CANON and NIKON…taking a walk on the DARK side…
- NASA's Space Place
- Eye Candy
- Treasurer's Report
- Upcoming McCallion Planetarium Shows
- Upcoming Events
- Contact Information

Chair's Report (continued)

Our Annual General Meeting takes place at the October meeting. It's at this meeting that we look after most of the club's business for the year, (the delivery of the club's financial report and the election of the club's council for the upcoming year). *Paul Delaney* will be returning as our guest speaker.

We have been lucky to have some very good people looking after the club's interests this year, and I feel privileged to have been associated with them. The club cannot operate without people willing to get involved with the day to day operations of club's business. Even though we do have a great group of people now, we are always looking for, and need, new council members. If you think you would like to get more involved in the club, please feel free to contact me at my cell (905) 966-2550 or e-mail me at *chair 'at' amateurastronomy.org* and we can talk about what you would like to do.

This is your club, and it needs your help to continue. I hope to see you at the meeting on September 14th in the Spectator Building auditorium.

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.

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.

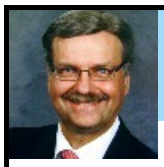
Please contact *Jim Wamsley*, at:

905-627-4323

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

Masthead Photo: *Merak, M108 and M97, by Bob Christmas.*

Taken May 8, 2018 from Barry's Bay, Ontario, with his Canon 40D through his 300mm Tamron lens, at f/2.8 & ISO 1600, for 16 91-second exposures (24 minutes 16 seconds total). Cropped and zoomed in. Upper right to lower left are Merak (Beta Ursae Majoris), Galaxy M108, and planetary nebula M97, The Owl Nebula.



The Sky For September 2018 by Steve Germann

The summer has flashed past me.

I am sad to report I did not go to Starfest or Cherry Springs, but I am happy to report that I did, in fact, participate in an astronomy event in Freelton on August 8.

And of course I saw 5 Perseid meteors on the Saturday Binbrook Perseids event. I happened to be looking up at the time of the fireball. It was fun to see.

This September, astronomy events are shaping up.

Zodiacal Light

In the mornings, this being the Northern Hemisphere, you will be able to see Zodiacal Light, which is a large triangle pointed towards the zenith in the morning light. It is best viewed from a dark place, as it's total brightness is comparable to the Milky Way,

http://earthsky.org/astronomy-essentials/everything-you-need-to-know-zodiacal-light-or-false-dawn

You have to get up pretty early in the morning to see it... 2 hours before dawn.

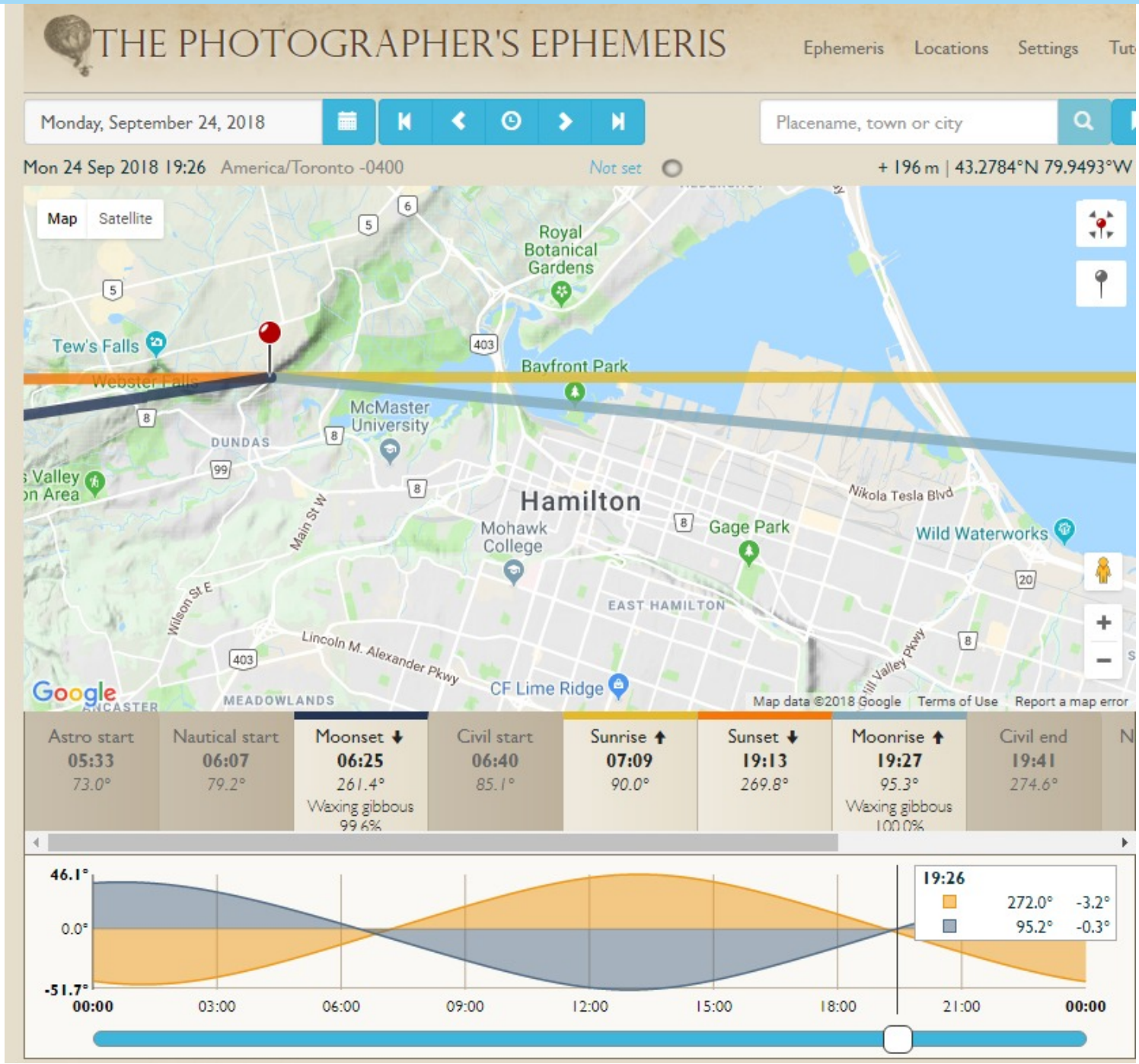
I have seen the Zodiacal light from Cherry Springs when it effectively ended my observing for the night, by competing with the interesting stuff in the east.

It was a pyramid of light reaching almost to the Pleiades.

(Continued on page 4)

Talay Daniel Erol caught this image of the zodiacal light in late August 2017 --- with the bright planet Venus in its midst --- from Adrasan, Antalya, Turkey

The Sky For September 2018 (continued)



The Moon

Speaking of moons, the *Lunar X* is not easy to get this month, Sept 17 0632UT (which is 2:30 AM EST), but the Full Moon will be rising on September 25 with an azimuth of 95.6 degrees at 19:26 EST. That's straight out over the lake.

Sunset that day is 19:12 so there will be no distraction, and the eastern horizon will be darkening.

If you try from Sydenham Road, be prepared to look hard for the Moon, because it will be far away over the lake, and might be invisible until it has risen a degree or two.

A calibrated compass and binoculars might help you to spot it on the horizon. There's a lot of air between you and the Moon, and it will be very red and very dim.

High five if you can see it before the bottom of the Moon clears the horizon.

More specifically, The Harvest Moon

September is famous for the Harvest Moon, which is an interesting phenomenon.

(Continued on page 5)

The Sky For September 2018 (continued)

The Full Moon gives farmers more light in the evening, extending the day, since it rises at sunset. As the full moon rises in September, it tends to rise only 30 minutes earlier each night, but the northern horizon slopes in such a way that the Moon rises in the evening several days in a row, and as always, the distant moon seen against the distant horizon looks huge.

You can partake of this illusion when you are out in the evening this September near the 24th and 25th. (See the Photographer's Ephemeris chart on the previous page for the evening of September 24th.)

WHAT MAKES THE HARVEST MOON DIFFERENT FROM OTHER FULL MOONS?

There are just a little over 12 complete Moon cycles every year, on average (there being about 29.53 days in a synodic month). The Harvest Moon isn't like the other Moons. Usually, throughout the year, the Moon rises an average of about 50 minutes later each day. But near the autumnal equinox, the difference is only 30 minutes.

Additionally, the Full Harvest Moon rises at sunset and then will rise very near sunset for several nights in a row because the difference is at a yearly minimum. It may almost seem as if there are full Moons multiple nights in a row!

https://www.almanac.com/content/what-harvest-moon

They have a 'scientific explanation' on that same page if you scroll down. It's actually quite accessible.

Mars

Mars is now an evening apparition, quite bright and definitely reddish, in the evening sky. As September progresses, it will set earlier and earlier. We are running away from Mars now.

There is still plenty of detail to see on Mars. Use the highest power eyepiece.

Mars is bright and will show even in a smallish scope.

Comets

From this page… http://earthsky.org/space/2-comets-21p-giacobini-zinner-wirtanen-2018

"Comet 21P/Giacobini-Zinner – affectionately called simply 21P by astronomers – is currently approaching the Earth and sun at incredible speeds (about 14 miles/second, or 23 km/s). Its closest approach to both the Earth and the sun takes place on the same day – September 10, 2018 – when this comet will sweep past Earth at a completely safe distance of 36 million miles (58 million km) from our planet. That's nearly as far from us as the next planet outward in orbit – Mars – is right now. But, for a comet, it's relatively close."

On September 10th, 21P will pass very close to the rich cluster M37 in Auriga. You will be rewarded to see the comet move among the stars.

Meteor Showers

At 5 per hour, the *Epsilon Perseids* are a pretty weak meteor shower, peaking about September 9th, but then you will have only a very thin crescent moon that sets early, to hinder your view.

(Continued on page 6)

The Sky For September 2018 (continued)

There are usually about 6 sporadic meteors per hour, so you will have to keep careful track to know for sure that you have seen one of these.

The Equinox

The Autumnal Equinox marks the start of Fall. This year it is at 1:54 UTC on September 23. That's late and has to do partly with the timing of leap years, which can move our calendar around relative to the equinoxes.

Are you a fall person? The fall constellations are coming. The best of these is *Orion* which will rise 6 hours after sunset on September 23. Orion has a memorable place in the sky, being along the celestial equator, at the same longitude as the Sun's location at Summer Solstice.

That means it rises at sunset on the Winter Solstice, and about 2 hours earlier each month later. Likewise, later each month earlier... if you get my (and the celestial) drift.

So now that Orion has been sorted, take some binoculars and enjoy the glow of its many stars.

You will benefit from an attachment that can put your binoculars on a tripod. Ideally, you would get a parallelogram, which allows you to comfortably observe with a friend of different height, so that you both can use the binoculars without losing the pointing. A parallelogram features a vertical support at the tripod and another at the binocular location. Diagonal bars connect the 2 verticals, just like the parallelogram geometric shape. Hence the name. One of the diagonals continues beyond and has a counterweight on it. The 2 arms are such that you can adjust things vertically without losing the pointing. A parallelogram makes a great gift for any astronomer.

Make sure the connection to the center pivot is sturdy. That's where they often break. I have designed an inverted parallelogram, which is remarkably stable. It allows me to have the binoculars perfectly balanced at any position and angle. But it's big. I hope to do a demo at our October meeting.

The Planets

The Heavens Above website has its Planet Summary:

https://heavens-above.com/PlanetSummary.aspx

Planets are so bright that they can be easily seen in light polluted skies too. Especially with binoculars or a telescope.

Although it is setting early, like 20:42 today (Fri Aug. 31st), *Venus* is still bright and prominent.

Saturn and *Mars* are still well up in the sky at midnight.

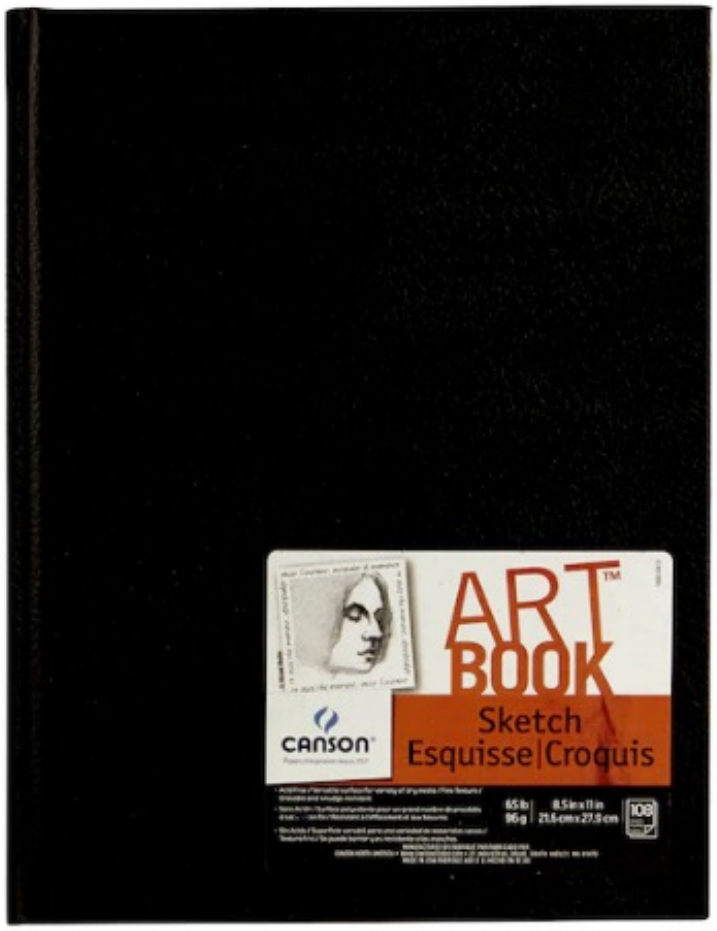
Jupiter sets before 11 PM.

Neptune is in opposition on September 7th.

Mars won't be in opposition again until October 2020. Mars has the longest interval between oppositions for any planet, when viewed from Earth.

(Continued on page 7)

The Sky For September 2018 (continued)



CANSON® SKETCH BOOK

This hardbound sketch book is perfect for capturing and preserving your artwork, thoughts and memories. The multipurpose book features quality sketch paper with a versatile surface and fine tooth that has good erasability and is smudge resistant.

Details:

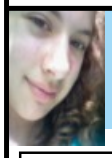
- 8.5" x 11"
- 65lb/96gsm
- 108 sheets
- Acid free

Like Be the first of your friends to like this.

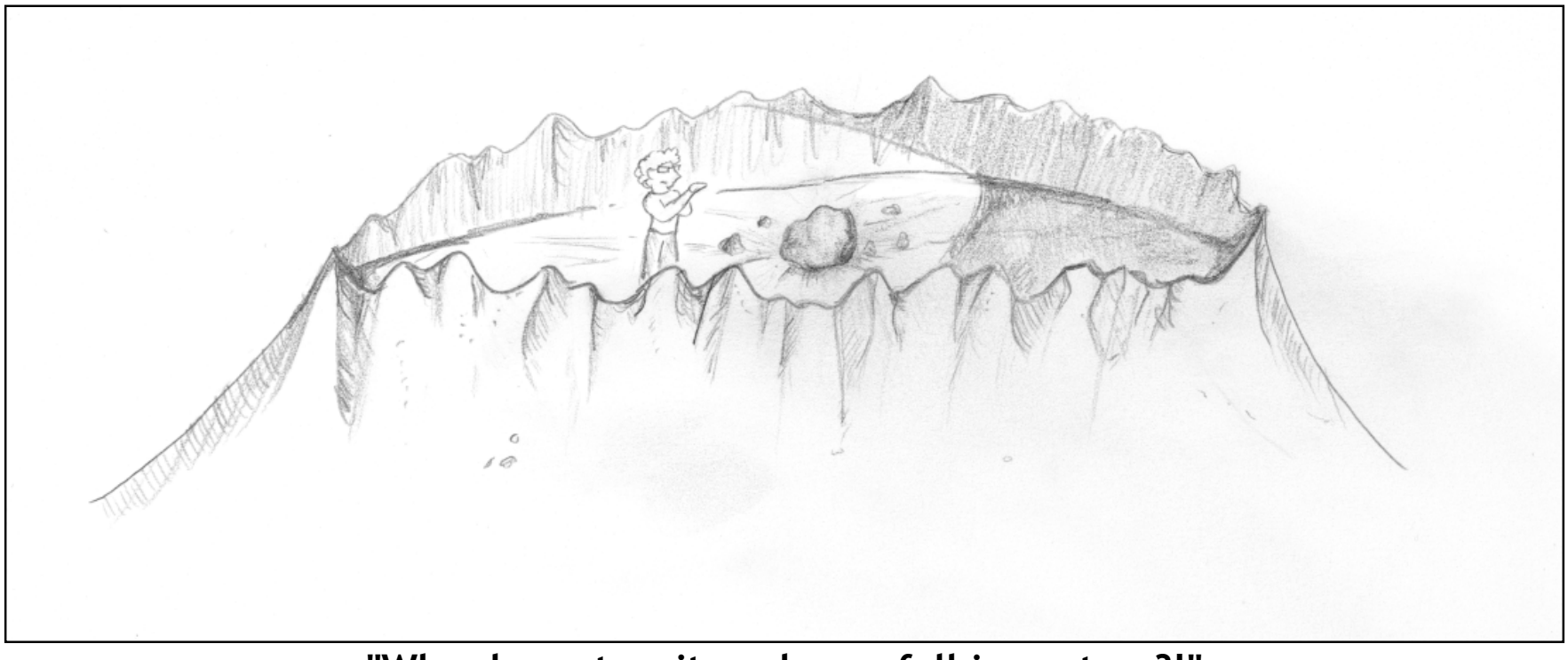
Facebook page for the Canson® Sketch Book

If you still need to get an observers log book, you should consider the sketch book from Michaels which sells for about $10. The heavy paper won't go soggy if there is a little dew.

Clear Skies,
Steve Germann
Observing Director
Hamilton Amateur Astronomers



Cartoon Corner by Alexandra Tekatch



"Why do meteorites always fall in craters?!"

CANON and NIKON…taking a walk on the DARK side…

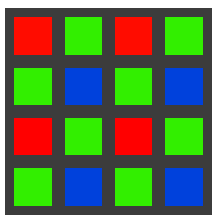
by Peter Wolsley

One aspect of astrophotography is image calibration. All this really means is to attempt to compensate for as many known defects in your camera and telescope as are possible. Many astrophotography subjects are extremely dim so digitally developing astrophotos requires skill and lots of image brightening. As a result these defects can dramatically affect the quality of the resulting image. Because DSLRs do not have any cooling mechanism they tend to become noisy both as the camera temperature increases and as the exposure length increases. With astrophotography we get into exposure lengths measured in minutes so this noise becomes quite significant. This "noise" has been given a name…DARK current. DARK refers to the fact that this noise appears even if the lens cap is left on the camera…i.e. in the absence of light. Current refers to the accumulation, or flow, of electrons per second into the individual camera pixels. This DARK current is composed of two parts. The first is DARK noise which is completely random noise. The second is DARK signal which is not random but is unique to every imaging chip. DARK signal typically looks like scattered grit over the photo that is very dim but is present in every astrophoto.

Astrophotographers have found ways to partially address a camera's DARK current by image stacking and by creating *master DARKs*. Image stacking refers to using a program that registers where the stars are in each astrophoto and then carefully stacks each photo so that the stars retain their brightness but any random noise is dramatically reduced. A master DARK is simply a stack of several DARK images. Each DARK image is taken at the same camera temperature and exposure length as the astrophotos, but with the lens cap in place. The resulting master DARK is extremely dim because most of the DARK noise is gone. The DARK signal remains intact. Astrophotographers use these master DARKs to remove the DARK signal from each astrophoto before registering and stacking. It is common practice to refer to these DARK images as being "DARK frames" as a historic "tip-o-the-hat" to the days of film photography.

I was able to obtain some Canon DARK frames from Matthew Mannering. He gave me DARK frames from two Canon cameras. A T5i and a T7i. I own a Nikon D5300. So, to kick off this "walk on the DARK side" here is an initial comparison of some of the camera specifications.

Description	CANON T7i (800D)	CANON T5i (700D)	NIKON D5300
Max Image size	6000 x 4000	5184 x 3456	6000 x 4000
DARK Image size (DCRAW)	6286 x 4054	5206 x 3474	6016 x 4016
Pixel size	3.72uM	4.3uM	3.8uM
Effective Pixels	24.2 M	18 M	24.2 M
Total Pixels (approx.)	25.8 M	18.5 M	24.78 M
Sensor Type	APS-C-CMOS	APS-C-CMOS	APS-C-CMOS
Colour Filter Array	RGGB	RGGB	RGGB
Optical Low Pass Filter	Permanent	Permanent	None
A/D Conversion	14bit	14bit	14bit
Minimum Value (DCRAW)	0	0	588
Darkness Value (DCRAW)	2024	2024	600
Maximum Value (DCRAW)	16383	13583	16383
Image Processor	DIGIC 7	DIGIC 5	EXPEED 4



All three of the cameras being studied have imaging chips that have a Colour Filter Array (CFA) placed over top of the imaging chip as shown here. This causes the very top left pixel to have a red filter in front of it so that it becomes sensitive to only red light. The pixel to its right has a green filter in front of it. These red and green filters alternate back and forth across the entire width of the sensor. On the very next horizontal line of pixels there are alternating green and blue filters. This scheme is repeated over and over across the millions

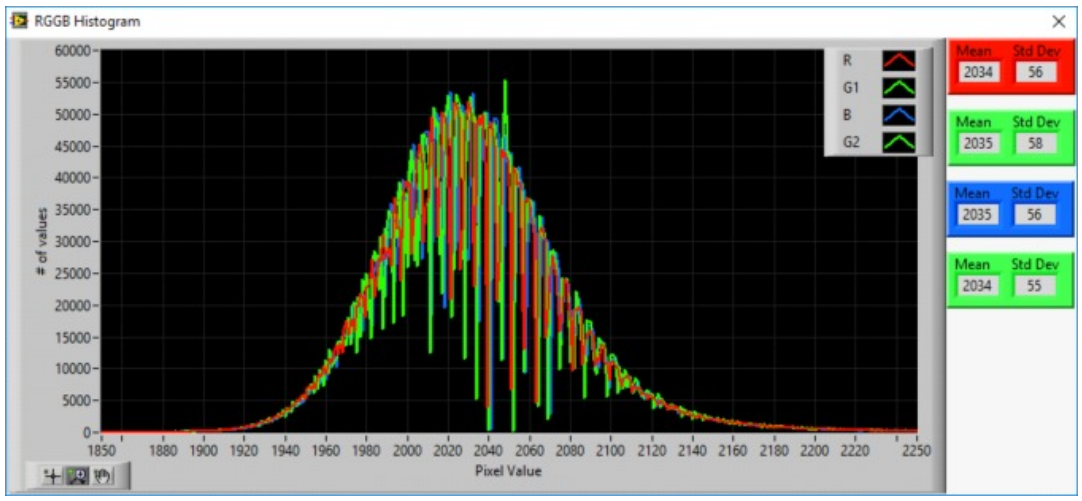
(Continued on page 9)

CANON and NIKON…taking a walk on the DARK side… (continued)

of pixels on the imaging chip. The RAW file format for these cameras (.CR2 for Canon, .NEF for Nikon) contains the values obtained from these pixels.

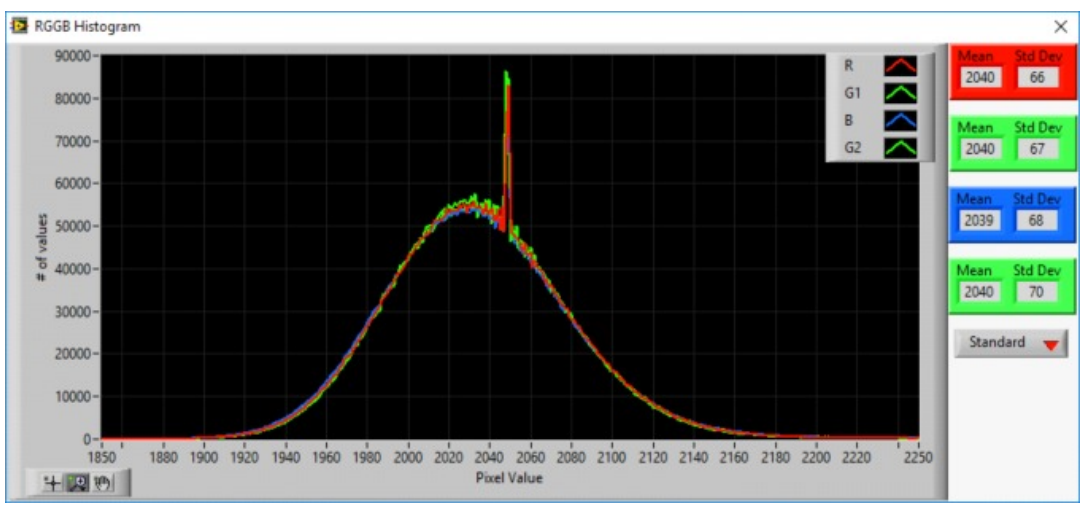
Both Canon and Nikon use similar approaches when storing their RAW pixel values. They establish a Darkness value for each photo and then they shift the RAW values so that the Darkness pixel value is the same for every photo. I suspect that they have optically blackened pixels that they use to determine what the Darkness value is for each exposure. I used a program called *DCRAW.exe* to extract the RAW pixel values for DARK frames created with all three cameras. For the Canon cameras the Darkness value is set to roughly 2024. This means that when viewing the histogram for a Canon DARK frame it's histogram will always be centred at roughly 2024. For my Nikon camera the Darkness value is 600. Nikon goes one step further which I am not all that happy about. Nikon must have thought "who cares about pixel values that are darker than Darkness". Nikon imposes a hard clip of the pixel values so that the minimum allowable value is 588. This hard clip causes the histogram for a Nikon DARK image to look like the lower half is missing!

I have written a program that generates histograms indicating the distribution of these values for the red, green1, green2 and blue pixels. I also included some statistics which include the mean, or average value for each colour and the standard deviation for each colour. The standard deviation value is a very good measure of the amount of noise, or scatter, in a DARK frame. Most manufacturers will quote a standard deviation value when describing the DARK current in their imaging sensors.



This is a RGGB histogram for a CANON T5i ISO1600 240 second DARK frame. The X-axis is the pixel values found in the DARK frame. The Y-axis is the number of pixels with the same value. The mean values for all four colours of pixels are roughly 2034. This typically corresponds to the peak, or top-of-the-mountain, of the histogram. The standard deviation for all four colours of pixels is roughly 56. The definition for standard deviation says that the pixel values that are within the mean value +/- one standard deviation represent 68.2% of the total number of pixels. For this example this would mean 2034 +/-56. The definition also defines that the mean +/- two standard deviations represent 95% of the total number of pixels and that the mean +/- three standard deviations represents 99.7% of the total number of pixels.

This CANON T5i ISO1600 240 second DARK frame histogram was taken at an ambient temperature of 20 Celsius. The camera had been resting at 20 Celsius for several hours with the power OFF. The camera was turned ON and the DARK frame was immediately taken. Unlike Nikon, Canon does not have a minimum clamp value so the entire histogram is present.

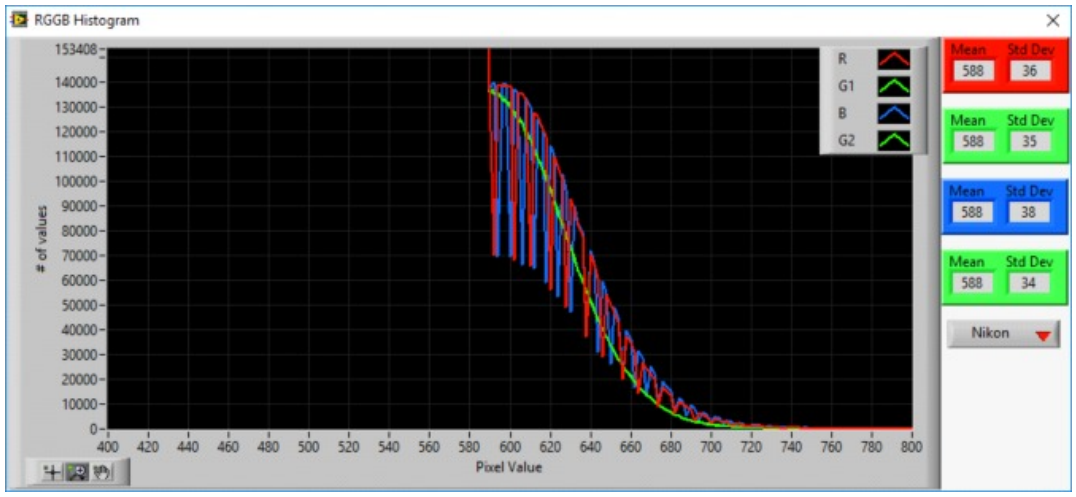


This is a RGGB histogram for a CANON T7i ISO1600 240 second DARK frame. The ambient temperature was 20 Celsius. The camera was prepared and turned ON similar to how the T5i DARK frame was taken. The T7i histogram looks very smooth compared to the T5i.

(Continued on page 10)

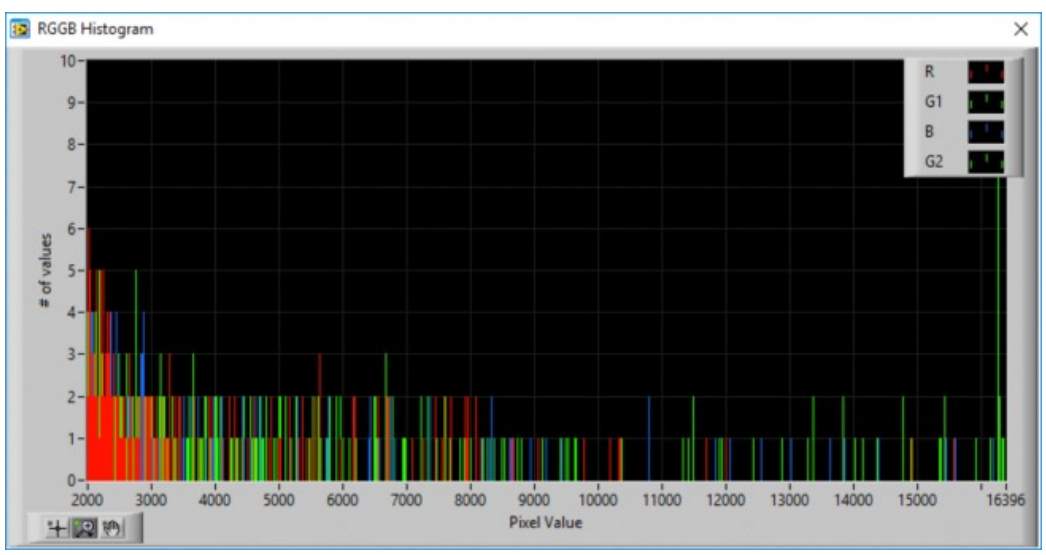
CANON and NIKON…taking a walk on the DARK side… (continued)

I suspect this is because the T7i camera is a higher resolution device. The mean value for this DARK frame is roughly 2040 and the standard deviation is roughly 68. The first 36 scan lines of the T7i RAW .CR2 file appears to contain optically blackened pixels. In addition, every scan line of the T7i begins with 262 pixels that also appear to be optically blackened. Regardless of the image being taken these pixels never respond. I excluded these pixels in the histogram and in the statistics shown. In spite of excluding these 1.2 million inactive pixels I can't explain the large spike in the histogram. The spike is at values 2048 and 2049.



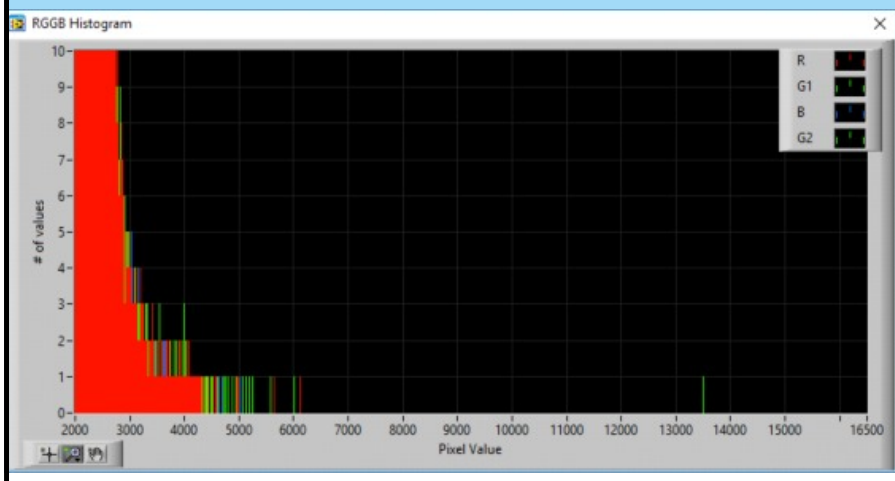
This is a RGGB histogram for my NIKON D5300 ISO1600 300 second DARK frame. The ambient temperature was 20 Celsius. The camera was prepared and turned ON similar to the Canon cameras. You can clearly see that the left side of the histogram is missing. I mentioned earlier that Nikon clamps the pixels values so that none can be lower than 588. This really messes up creating statistics for a Nikon histogram. After some searching on-line I found an equation for calculating standard deviation when either the top or bottom half of the distribution is either clamped or missing. This is why the mean values are all 588. The standard deviation for this DARK frame is roughly 36.

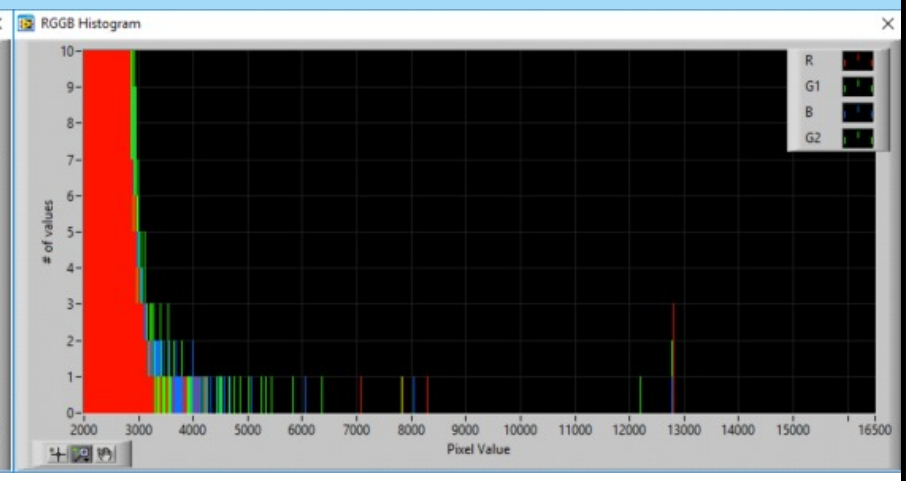
There is some interesting methodology behind the choppy looking Nikon histogram. Nikon decided that because all images contain noise that it simple did not make sense to save pixel values that differ by values that are dramatically less than the inherent noise. When you look at the RAW pixel values in a Nikon DARK frame and sort the pixel values from lowest to highest you immediately notice that the values start at 588 and then 590…then 592, 594, 596, 598 etc. They only have values that appear as increments of 2. If you look further along in the sorted list of values you notice they start incrementing by 3, then by 4, etc. This is because Nikon uses the fact that any received light always has an associated "shot noise". The theory is that if a light source was emitting 100 photons per pixel that there is also a "shot noise" uncertainty that acts like a Gaussian noise distribution with a standard deviation of sqrt(100) = 10. This means that there is an uncertainty that is typically +/- 3 standard deviations wide which in this case is +/- 30. So one pixel could receive 130 photons and the immediately adjacent pixel might receive 70 photons. When you do the math and translate the variation in photons back into the expected variation in pixel count values you realize that saving pixel values incrementing by 1 is overkill. It's this "increments of 2" philosophy that contributes to the choppy Nikon histogram. For a detailed explanation of what has been called Nikon's "lossy" NEF compression please follow this link…
http://theory.uchicago.edu/~ejm/pix/20d/tests/noise/noise-p3.html#bitdepth



Another peculiar characteristic of the histograms only comes to light when you look at the "Hot" pixels. These are the pixels that have very high values. The graph shown here is the same Nikon ISO1600 300 second exposure DARK frame. I have change the scale so that it shows the distribution of "hot" pixels. For the Nikon camera there is a significant amount of these "hot" pixels distributed all the way up to values equaling the maximum value of 16383. *(Continued on page 11)*

CANON and NIKON…taking a walk on the DARK side… (continued)



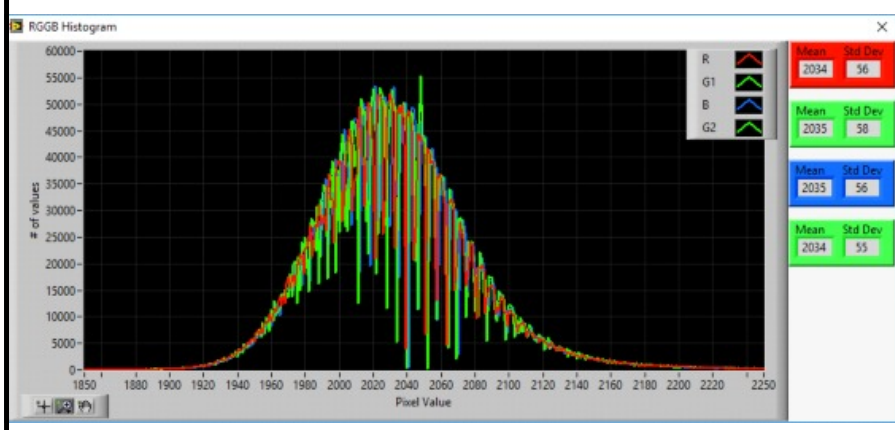


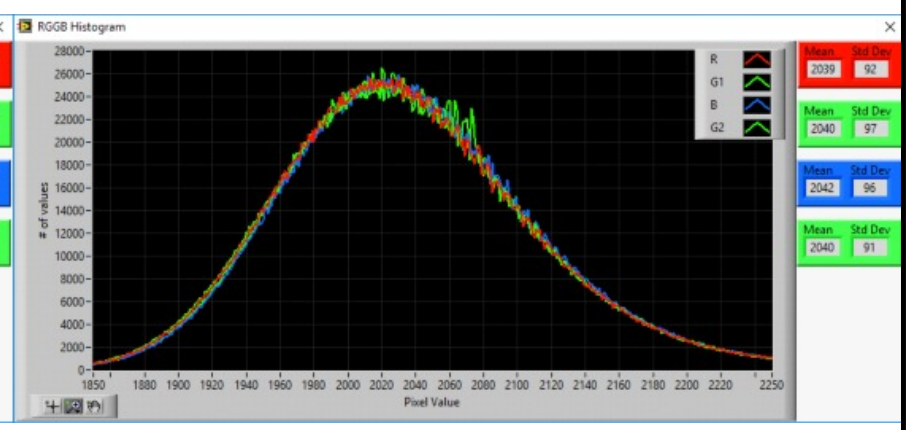
The histogram on the left is for the Canon T5i 240 second ISO1600 DARK frame. The camera has very few "hot" pixels. To be completely fair the Nikon DARK is a 300 second exposure and the Canon DARKs are 240 second exposures so the Canon DARKs should look quieter. The reduction in Canon "hot" pixels is significantly better than the Nikon.

The histogram on the right is for the Canon T7i 240 second ISO1600 DARK frame. Again, the camera has very few "hot" pixels.

I don't think I can comment on this finding without showing my bias for my Nikon camera…but I will anyway. The Nikon camera is manufactured without an optical low pass filter. Nikon claims that this gives the camera the ability to "bring out NIKKOR lenses' sharpness to make full use of the 24.2-megapixel resolution". I suspect that part of removing the Optical Low Pass Filter was some tweaking of the electronics in the camera to increase it's pixel-to-pixel dynamic performance so that sharper focus is not hampered by some internal spacial filtering. The end result is a camera that appears to have more "hot" pixels but also sharper images. Both Canon cameras have Optical Low Pass Filters and, possibly, some spacial filtering in the electronics. The end result "could be" that this filtering helps to reduce the number of apparent "hot" pixels. All of these cameras have image processors running highly proprietary algorithms so it's difficult to delve deeper. The only other explanation I can imagine would be that Nikon CMOS sensors have significantly more "hot" pixels than Canon CMOS sensors. The RAW data that these cameras generate certainly supports this claim but I have to believe that the CMOS technology behind the various sensors is too similar for that to be the case.

I was supplied 10 DARK frames from each of the Canon cameras. They were taken over the course of roughly 1 hour. I noticed a definite difference in noise between the first and last DARK frame which I will show next.

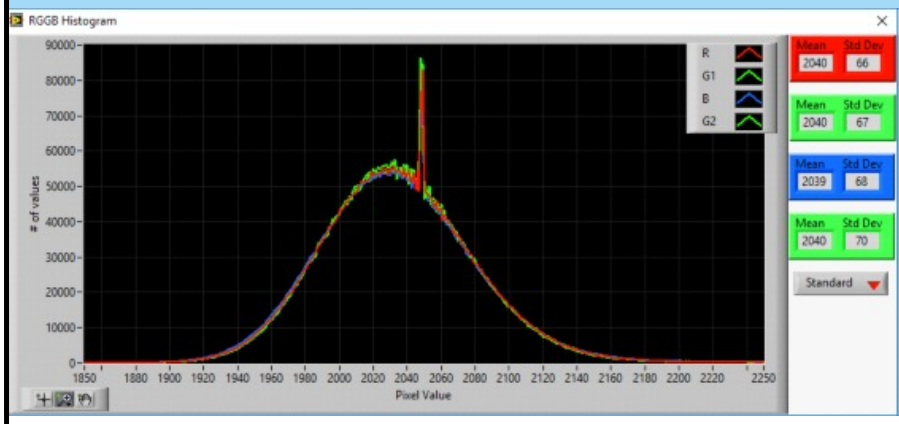


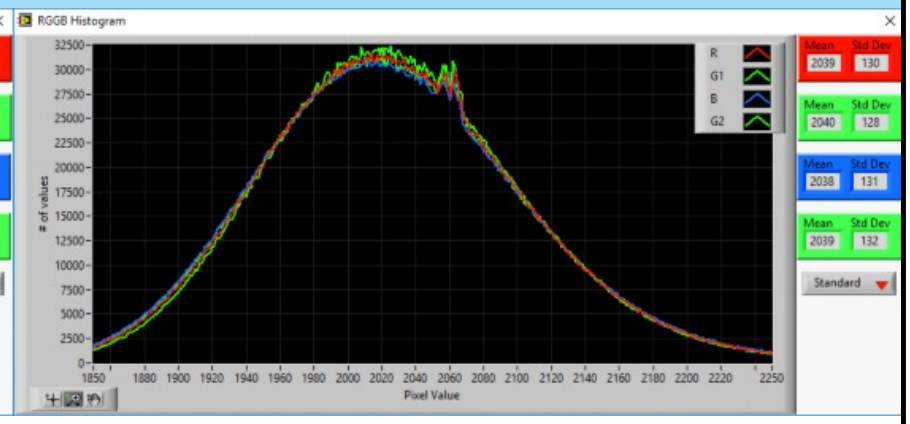


The two histograms above are for the first and last Canon T5i DARK frames. The first DARK frame has a standard deviation of roughly 56. The last DARK frame has a standard deviation of roughly 95. Over the course of one hour the noise in the DARK frames increased by 70%.

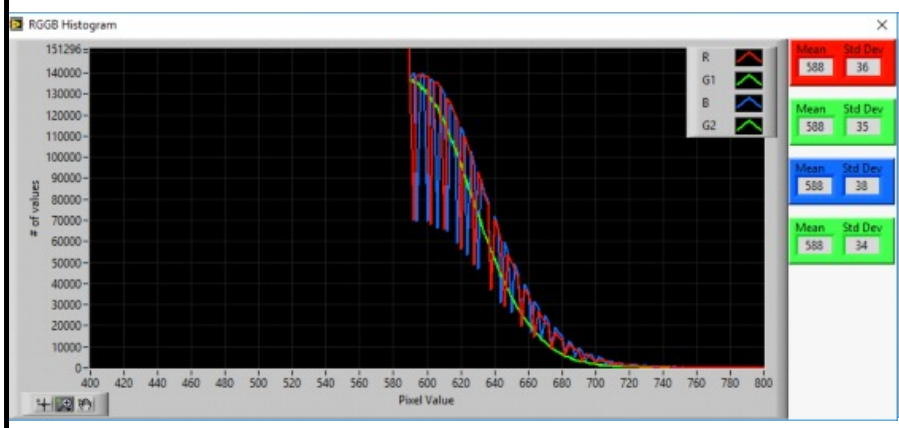
(Continued on page 12)

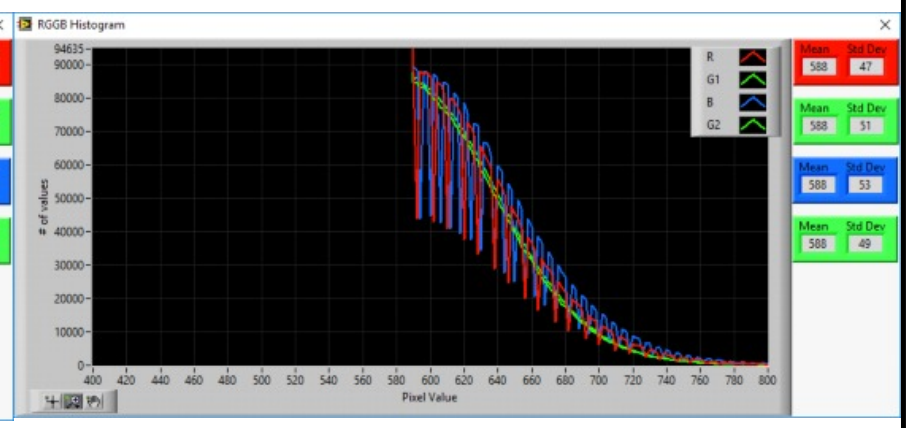
CANON and NIKON…taking a walk on the DARK side… (continued)





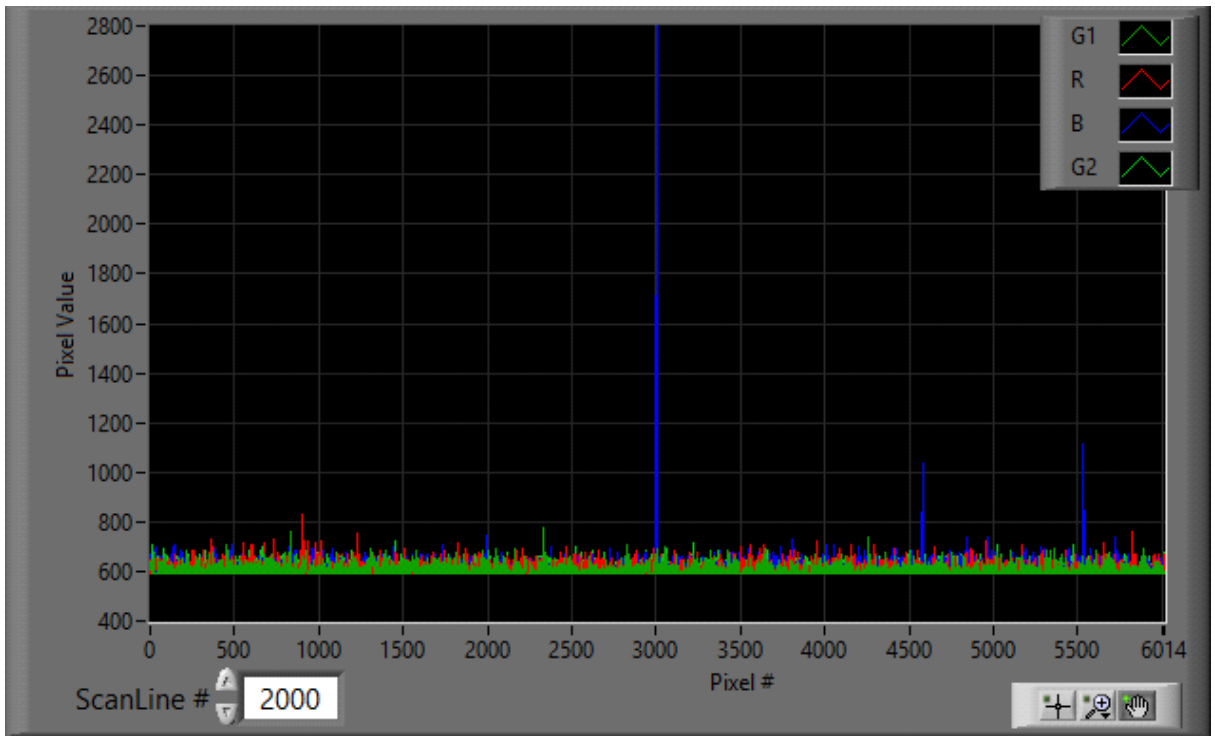
The two histograms above are for the first and last Canon T7i DARK frames. The first DARK frame has a standard deviation of roughly 68. The last DARK frame has a standard deviation of roughly 130. Over the course of one hour the noise increased by 90%.





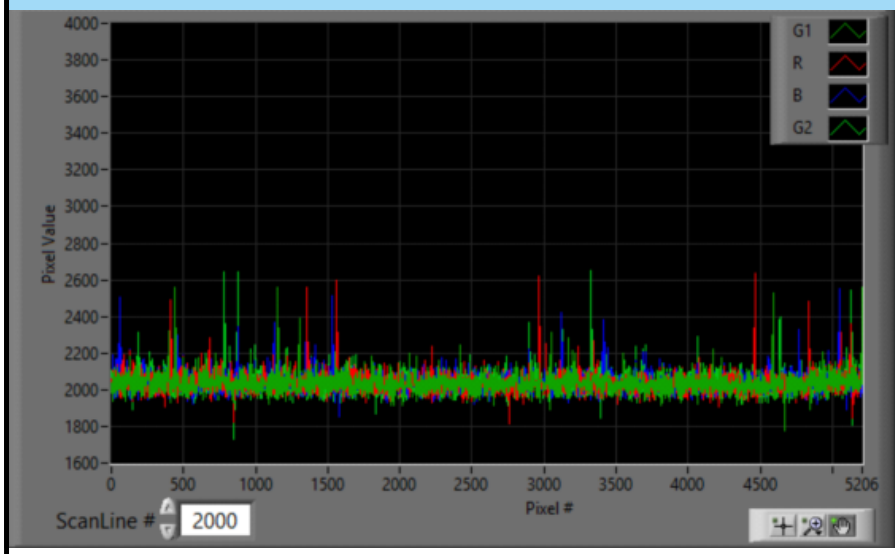
These histograms are for my Nikon D5300 ISO1600 300 second DARK frames. The histogram on the left shows the noise in my camera when it is first turned ON. The standard deviation for this histogram is roughly 36. The histogram on the right shows the noise in my camera after continuously taking ISO1600 300 second DARKs for 2.5 hours. The standard deviation for this histogram is roughly 51. The very big difference here is that I learned last year that I could attach a computer fan to the back of my camera and by blowing the air on the camera I could significant reduce the amount of noise in my astrophotos. Without the fan the noise in my astrophotos would steadily increase 140% over the course of 1.5 hours. With the fan, the noise in my photos increases only 40% and levels out after only 30 minutes.

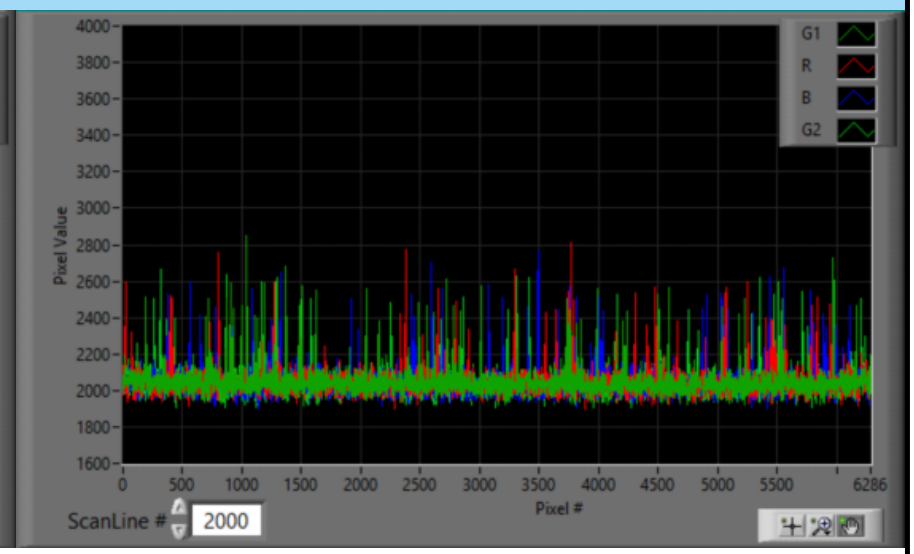
This is yet another way of visualizing the RAW pixel values in a DARK frame. This is the Nikon ISO1600 300 second DARK frame. I wrote a program that can display the RGGB values for each horizontal scanline pair in the image. This is for scanline 2000 which is in the centre of the 6016 x 4016 image. Scanline 0 would be the top line of pixels…scanline 4016 would be the very bottom line of pixels. This display is actually based upon two consecutive scanlines. Scanline 2000 contains red and green1 pixels. Scanline 2001 contains the green2 and blue pixels. You can clearly see a very "hot" blue pixel close to the centre of the scanline. You can also see the effect of the clamping of the minimum values to 588.



(Continued on page 13)

CANON and NIKON…taking a walk on the DARK side… (continued)

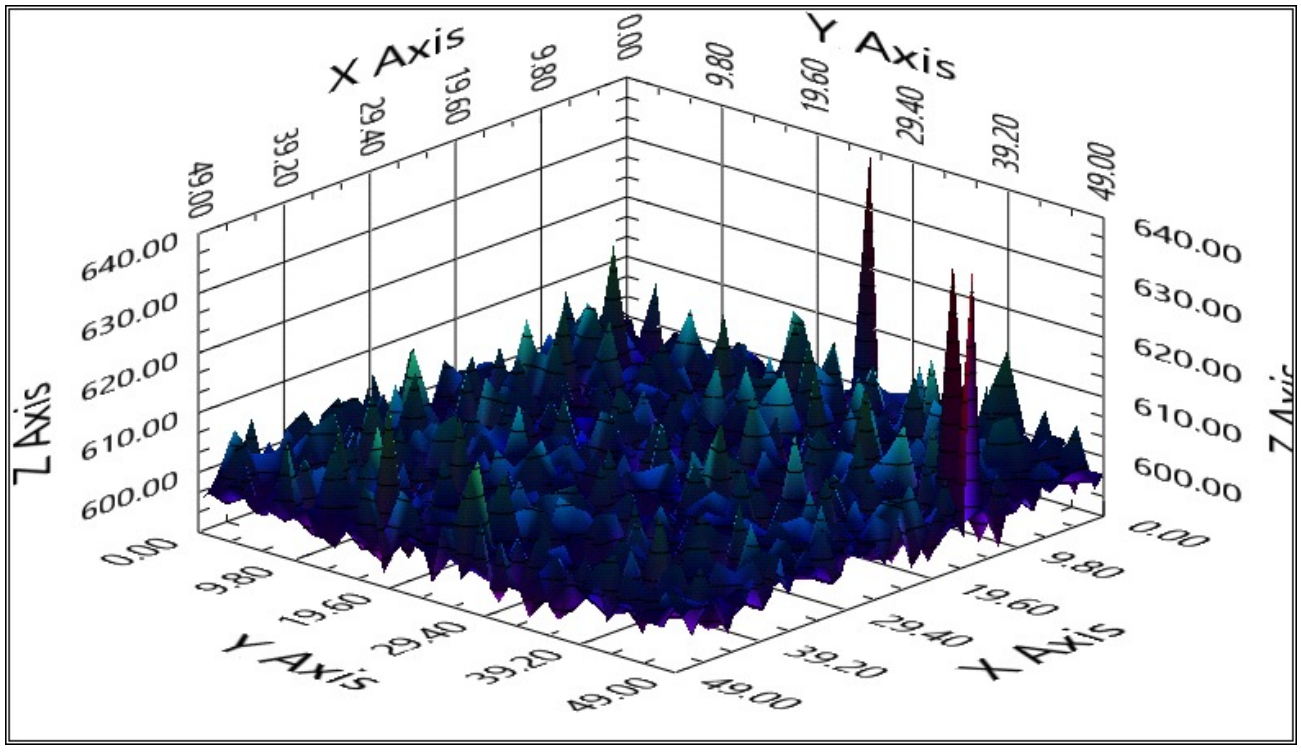




On the left is the Canon T5i ISO1600 240 second DARK frame. I chose the same scanline 2000 which is roughly in the middle of the RAW 5206 x 3474 image. You can clearly see that none of the pixel values are clamped.

On the right is the Canon T7i ISO1600 240 second DARK frame. I chose the same scanline 2000 which is roughly in the middle of the RAW 6286 x 4054 image. You can clearly see that none of the pixel values are clamped. You can also see what looks like even more noise compared to the T5i. These three graphs are pretty much typical for each scanline in each DARK frame. The data for the very first and very last scanlines are much noisier for each camera. Typically those scanlines are not displayed to the end user.

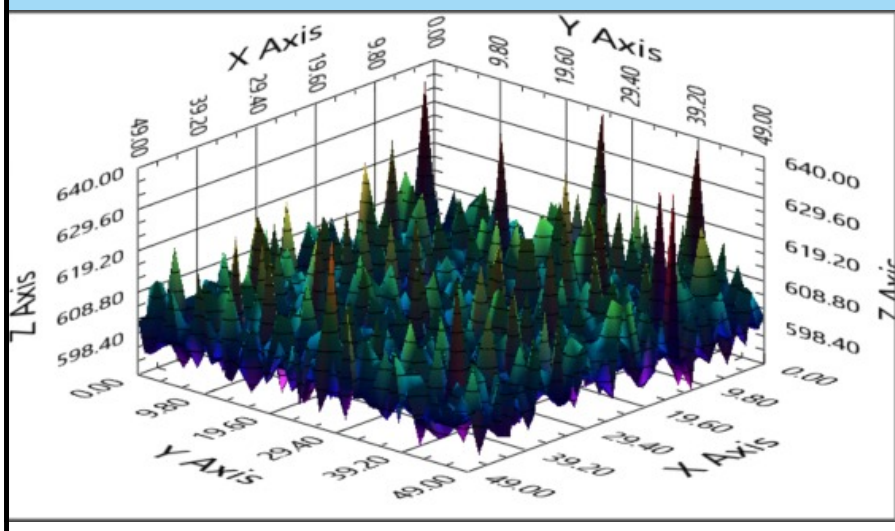
So what does DARK current look like? We need to examine master DARKs to understand what DARK current looks like. The master DARKs average out most of the DARK noise so that only the DARK signal remains. Master DARKs are extremely dim so it's not possible to view them as photos. Instead I have prepared 3D contour graphs of my Nikon D5300 master DARK frames.



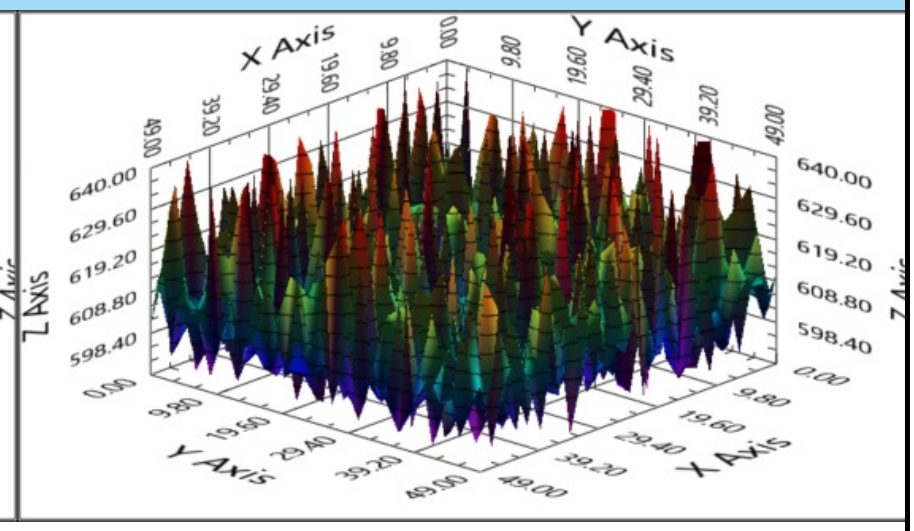
This is a 3D contour plot of the top left corner of my ISO200 300 second master DARK frame. Only a small 50 by 50 pixel square is shown here. I also only showed pixel values between 588 and 640 so that you could see the characteristic of the DARK current. Those tall spikes are "hot" pixels that occur in every photo I take with my D5300. What remains is the DARK current signal that I described at the beginning of this article as scatter grit. In reality what I am calling DARK current is just a catch-all name for all of the persistent imaging chip defects. Read noise is one of the persistent defects that is included in what I call "DARK current".

(Continued on page 14)

CANON and NIKON…taking a walk on the DARK side… (continued)

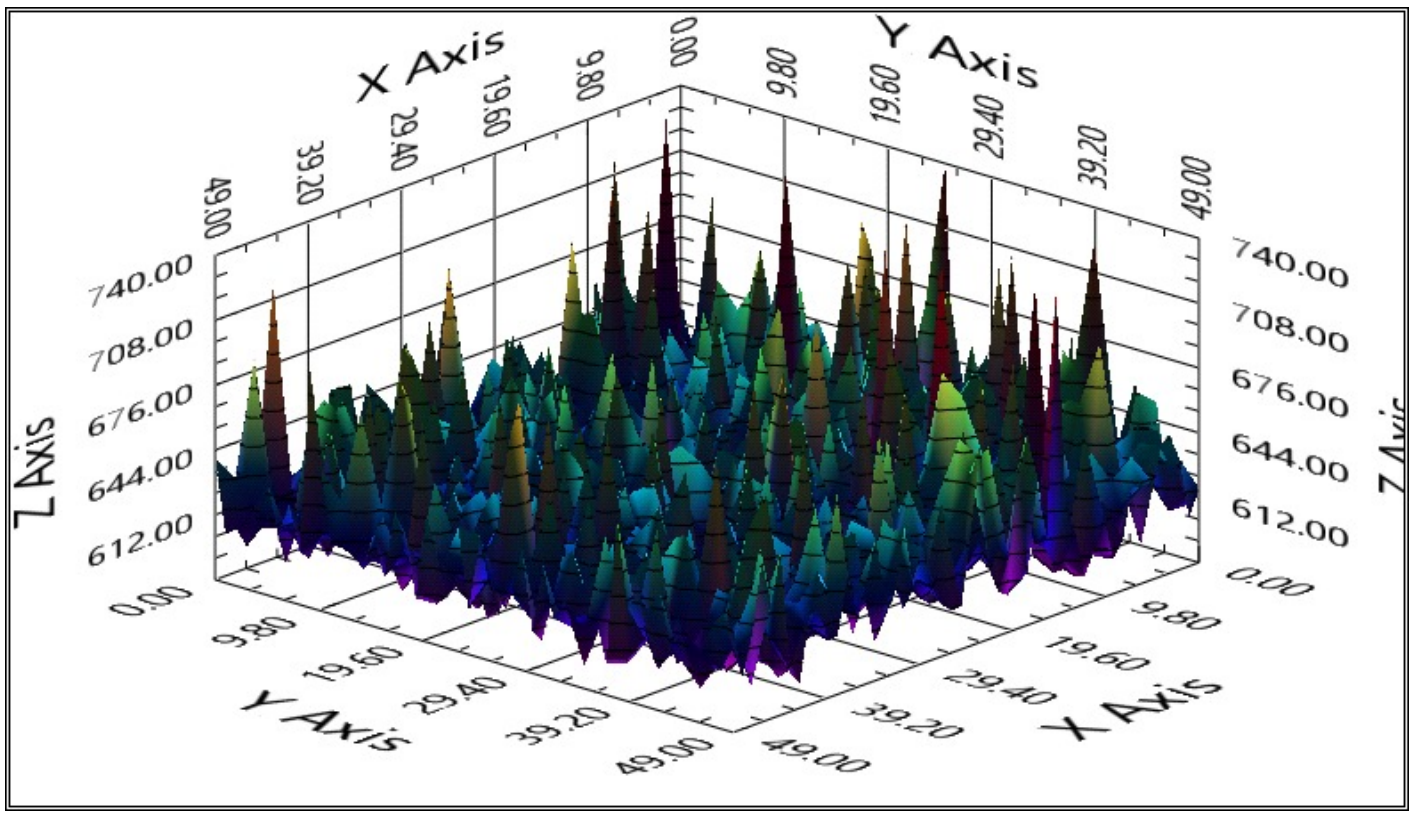


ISO400 300 second master DARK Nikon D5300



ISO800 300 second master DARK Nikon D5300

You can see that the DARK signal is getting larger as the ISO increases. The ISO800 300 second master DARK has a lot of pixel values that had to be clipped at the 640 level so it's not a good example for comparisons. The ISO400 300 second master DARK shows several tall spikes that are not truly "hot" pixels…they are just slightly brighter pixels. It's these slightly brighter pixels that cause issues in astrophotos. They are bright enough to be visible in astrophotos. When I stack multiple astrophotos its common for me to find that photo after photo needs to be moved slightly in one direction to get them to stack correctly. This is because my set-up has some differential flexure. The total movement may be small but these slightly brighter DARK current pixels end up looking like faint scratches or streaks. Using a guiding method called "dithering" does help but these slightly brighter DARK current pixels will still be visible.



This is my ISO1600 300 second master DARK for my Nikon D5300. I increased the Z axis maximum so that this graph looks very close to the ISO400 graph. Even though the pixel values are a lot bigger you can see that there are lots of contour details that are similar between the ISO400 and this ISO1600 graph. This shows that there truly is a DARK signal and not just random noise. I typically average 15 to 20 DARK frames when generating my master DARK frame.

So now that you understand a little more about DARK frames and DARK current I hope you will boldly go where astrophotographers dare to tread and take your own walk on the DARK side…

NASA's Space Place

This article is provided by NASA Space Place.

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.

Visit spaceplace.nasa.gov to explore space and Earth science!

A Trip Through the Milky Way

By Jane Houston Jones
and Jessica Stoller-Conrad

Feeling like you missed out on planning a last vacation of summer? Don't worry—you can still take a late summertime road trip along the Milky Way!

The waning days of summer are upon us, and that means the Sun is setting earlier now. These earlier sunsets reveal a starry sky bisected by the Milky Way. Want to see this view of our home galaxy? Head out to your favorite dark sky getaway or to the darkest city park or urban open space you can find.

While you're out there waiting for a peek at the Milky Way, you'll also have a great view of the planets in our solar system. Keep an eye out right after sunset and you can catch a look at Venus. If you have binoculars or a telescope, you'll see Venus's phase change dramatically during September—from nearly half phase to a larger, thinner crescent.

Jupiter, Saturn and reddish Mars are next in the sky, as they continue their brilliant appearances this month. To see them, look southwest after sunset. If you're in a dark sky and you look above and below Saturn, you can't miss the summer Milky Way spanning the sky from southwest to northeast.

(Continued on page 16)

NASA's Space Place (continued)

You can also use the summer constellations to help you trace a path across the Milky Way. For example, there's Sagittarius, where stars and some brighter clumps appear as steam from a teapot. Then there is Aquila, where the Eagle's bright Star Altair combined with Cygnus's Deneb and Lyra's Vega mark what's called the "summer triangle." The familiar W-shaped constellation Cassiopeia completes the constellation trail through the summer Milky Way. Binoculars will reveal double stars, clusters and nebulae all along the Milky Way.

Between Sept. 12 and 20, watch the Moon pass from near Venus, above Jupiter, to the left of Saturn and finally above Mars!

This month, both Neptune and brighter Uranus can also be spotted with some help from a telescope. To see them, look in the southeastern sky at 1 a.m. or later. If you stay awake, you can also find Mercury just above Earth's eastern horizon shortly before sunrise. Use the Moon as a guide on Sept. 7 and 8.

Although there are no major meteor showers in August, cometary dust appears in another late summer sight, the morning zodiacal light. Zodiacal light looks like a cone of soft light in the night sky. It is produced when sunlight is scattered by dust in our solar system. Try looking for it in the east right before sunrise on the moonless mornings of Sept. 8 through Sept 23.

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

This illustration shows how the summer constellations trace a path across the Milky Way. To get the best views, head out to the darkest sky you can find. Credit: NASA/JPL-Caltech

Eye Candy the Members' Image Gallery

(top) A setting striped **Sun**, obscured by the high haze of smoke from western fires, taken **August 19, 2018** by **John Gauvreau**.

(right) Hazy **Sun** with a different kind of stripes, those from a jet plane contrail, taken **August 18, 2018**, by **Matthew Mannering.**

Eye Candy the Members' Image Gallery

M97, the Owl Nebula, by **Peter Wolsley**.

Taken with his modified Nikon D5300 through his Celestron 8" EdgeHD scope, at f/10 and ISO 800.
Exposures: 12 x 4 minutes, for 48 minutes total.

Treasurer's Report by Ann Tekatch

Treasurer's Report for August 2018 (Unaudited)

Opening balance:	$9,723.91
<u>Revenue:</u>	
Memberships:	$315.00
50/50 Draw:	$65.00
Picnic Ticket Sales:	$770.00
<u>Expenses:</u>	
PayPal fees - Memberships:	$9.69
PayPal fees - Picnic Ticket Sales:	$22.44
Closing Balance:	$10,841.78

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:**
  - **Sep 12: Introductory Astronomy for Kids — Solar System**
  - **Sep 19: Stories of the Sky**
  - **Sep 26: Serendipity**
- **For more details, visit www.physics.mcmaster.ca/planetarium**

UPCOMING EVENTS

September 8, 2018 — *25th Anniversary Celebration, BBQ & Night Sky Tour* at Binbrook Conservation Area.

September 14, 2018 - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium. Our main speaker will be HAA member ***Kevin Salwach***, who will talk about naked-eye astronomy.

September 15, 2018 - 8:00 pm - 11:00 pm — *Public Stargazing Night* at Bayfront Park, Hamilton, ON.

October 12, 2018 - 7:30 pm — *Annual General Meeting* at the Hamilton Spectator Auditorium.

2017-2018 Council

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

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

Webmaster:
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 outdoor 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: haalibrarybooks@gmail.com