Nova Notes

The Newsletter of the Halifax Centre of the Royal Astronomical Society of Canada

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Chasing auroras edition

MAR / APR 2023

VOL 54 NO 2

FEATURING:

In this issue:

Cover Photos:

Main Photo:
Northern Lights Taken from Lake Torneträsk looking East in the Municipality of Kiruna on September 23, 2023 at about 2130 local time. This was a 3 second exposure taken with a Nikon D850 and Rokinon 24mm f/2 lens @ f/2, ISO3200.
by **Jason Dain**

Thumbnails (l-r):
St. Croix Observatory drawing by
Mary Lou Whitehorne

From the Editor

One of our local Osprey and the Waning Crescent Moon. March 26, 2023 by Lisa Ann Fanning

Ahhh Springtime! I don't know about you, but I sure am glad that we are out of the winter doldrums. I like winter a lot, usually, but this one was particularly … well, blah, I suppose is the best word. Too few opportunities to enjoy a clear winter sky viewing session, and it sure seemed like every event worth looking up for was shrouded by clouds. Now, we have arrived at a new season, and are ready for the Penatmuiku's or "birds laying eggs" time. Early migrant birds are arriving here in NJ and "love is in the air" as they say. I've been enjoying keeping tabs on our local Osprey pair who have been courting, with the male giving some wonderful aerial displays.

So much to celebrate about spring! Dave Chapman kicks us off with that celebration, so be sure to check out how he celebrated the Spring Equinox on page 5.

Also in this edition is a nice representation of the aurora borealis from two parts of the world.

I first heard about the aurora borealis when I was just a kid. My brother (14 years older than me) used to talk about the things he wanted to see in person. As any adoring little sister would, I took interest in his list and made several of them my own goals. One I have managed to "check off" my list is the tides at Bay of Fundy. Other bucket list items have since slipped my mind, and I refuse to become a NY Islanders fan, but seeing the northern lights remains near the top of my list from those days. I don't get to travel as much as I did when I was younger, so I've been hoping they would "come to me," especially with all the solar activity we are facing in Solar Cycle 25. We had a close call recently, where the storm created an aurora visible as far south as Virginia, but the "Jersey Nebula" (clouds) just weren't cooperating.

Luckily, I have talented friends who do travel and take amazing photographs, like Jason Dain who recently took a trip to Scandinavia (and at the right time too!). You can read all about his trip and see his beautiful photos in this edition.

We also "officially" welcome new member, Jeremy Kuzub. Jeremy has contributed his aurora knowledge to the Centre with a wonderful article in the May/June 2022 edition of *Nova Notes,* and more recently at our Centre's April 2023 members' meeting So, I was thrilled when he offered to share his March 2023 Yellowknife Aurora Hunting Trip Report.

Keeping with the theme, our resident poet, Paul Heath shares his poem, *Dancing Souls* as an ode to the aurorae.

And let's not forget our old friend, the Moon, as David Hoskin takes us to Mare Humorum in the next installation of his "Moonscapes" series.

Once you are through reading these great articles and perusing all our wonderful photo contributions, be sure to stop by the Puzzle Corner to challenge yourself. Many many thanks to Judy Black for adding this wonderful feature to *Nova Notes*. She puts a lot of work into them, whether she is tracking down and solving some vintage puzzles or creating brand new ones, she puts her all into this fun feature!

With continued gratitude,

Lisa

Upcoming Meeting Dates

- May 6
- June 3
- September 9
- October 14
- November 4
- December 2 (Members Meeting + AGM)

We are now hosting hybrid live/Zoom Members' Meetings. Halifax Centre meetings are usually held on the first Saturday of the month, except for July and August.

Come join us in-person in Room AT101 at Saint Mary's University or by pre-registering for the meeting on Zoom.

The meeting are recorded and become accessible shortly thereafter on our Halifax RASC YouTube channel. For information about the meeting and how to register for the Zoom session, please visit https://halifax.rasc.ca/index.php/activities/rasc-events

For past meeting replays, visit our YouTube Channel
https://www.youtube.com/c/raschalifax

YouTube

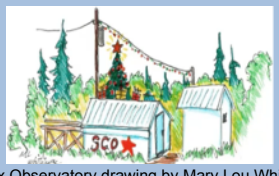
St. Croix Observatory

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix, NS The site has expanded over the last few years and includes a roll-off roof observatory with electrical out- lets, a warm-room, and washroom facilities. We welcome you to bring your own equipment or to use the Centre's 400-mm Dobsonian telescope,100-mm binoculars, and the recently acquired SCT and gear for astro-imaging.

Enjoy dark pristine skies far away from city lights and the company of like-minded observers searching out those faint "fuzzies" in the night. Most clear Moon-free nights, you will find our keen observers out there! Announcements of members visiting SCO are made on the Centre's Discussion List. If you are not a key holder and would like to become one or need more information, please contact the SCO Manager, John Liddard, at scomanager@halifax.rasc.ca.

SCO is Open!

Go to our website (https://halifax.rasc.ca) for the latest SCO usage guidelines.



St. Croix Observatory drawing by Mary Lou Whitehorne

Halifax RASC Board of Directors, 2023

Elected	
President	John Nangreaves
Vice-President	Patrick Kelly
Secretary	Peter Hurley
Treasurer	Dave Lane
Director	Judy Black
Director	Gregg Dill
Director	Matthew Dyer
Director	David Hoskin
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Honorary President	Mary Lou Whitehorne
Auditor (2022-2023)	Dave Lane
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Dark-Sky Preserve Committee, Co-Chair	Tony Schellinck
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Librarian	Jerry Black
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Nominating Committee, Chair	Peter Hurley
Nova Notes, Editor	Lisa Ann Fanning
Nova Notes, Copy Editor	John McPhee
Observing / EPO Chair	David Hoskin
St. Croix Observatory, Manager	John Liddard

Nova East Star Party

SAVE THE DATE FOR 2023!

August 18-20, 2023

(New Moon August 16)

A Message from the President

I'm a tech. Not a "normal" tech, a tech to the very core. I've done all the tech stuff and more, including designing and developing new tech as well as scientific research. I fix things. When things get too old to fix, I make new ones. When things are too out of date to fix, I'll design a replacement. It is quite simply what I am and who I am. I have been a techno-sci-eng-geek since I was a child. While most were reading comic books, I was reading encyclopedias for children and science books. Science hit me early, and thankfully my parents fostered and encouraged that curiosity, presenting new challenges to broaden my horizons. The gift component of ADHD, the ability to hyperfocus, was strong with me; the education system is not set up to support the ADHD brain but somehow my teachers understood this and supported it as best they could.
Some were life-changing educators, and to them I will always be grateful. They understood my ability to "grok" the most esoteric of subjects if given the right resources. Like that first astronomy book.

I was very young, I'm thinking Grade 5 (because 5th graders are smarter than the rest of us!), and it was an astronomy book for kids, with lots of pretty pictures and simplified illustrations for young minds. I must have memorized it word for word. I can still remember the picture that got it all started: The Horsehead Nebula, taken by the Mount Palomar Observatory. I was hooked. Anthropology was a goal, as was photo-journalism. I had a strong arts background and sharp photography skills, so anthropology it was! Have I mentioned I have ADHD? "The moment" happened in an anthropology class, the history of science and technology and how it shaped civilization), and the geek inside awoke: I don't want to study science, I want to DO science.
So into engineering I went. I had a strong sixth-sense for electricity so before long I was ears deep in some pretty esoteric R&D. Astronomy was a passion set aside in my youth but rekindled in middle age when I had more time and money to pursue a hobby.

Have you caught on to the subject I'm alluding to yet? Astronomy is science, technology, and art, and if you look around to our members you will see we have a strong background in science, keen skills with technology, and a love for the beauty we are so privileged to behold. We are generalists, from all walks of life, bound by those three common threads.

I love playing with the toys, in some ways more than looking at the wonders, and learning the science behind it all. I'm not an "armchair astronomer" by any means, that component is welcomed on cloudy nights, as are astro-tech projects. Like many of you I am building an observatory to facilitate the hobby in my dotage, and I really enjoy doing it. I'm already working on automating it, because I really enjoy doing that too (and it's my former profession).

Whatever brings you into astronomy, enjoy it. There are so many sub-subjects to focus on and not all of them require eye to eyepiece or memorizing errata. Fortunately we have scientists, engineers, tradespeople, and artists with extensive experience in just about everything and that is truly a great group to be in.

Clear Skies!
John Nangreaves
President

***Nova Notes*: The Newsletter of the Halifax Centre of the RASC**
PO Box 31011, Halifax, Nova Scotia B3K 5T9

Nova Notes is published five times a year, in February, April, June/July, September/October and December.

The opinions expressed herein are not necessarily those of the Halifax Centre.

Articles on any aspect of astronomy and related activities will be considered for publication.

Spring has sprung!

Tracking the Equinox with David Chapman at Sky Pillar

Dave Chapman writes: “Solar Noon on the Equinox at the Sky Pillar.* At this time the gap between the twin slabs of the binolith allows a shaft of light to fall due north onto the pavement. Triangular prisms mark the shadow end at the equinoxes and solstices.

This simple structure connects the earth and sky, tracking the passage of time during the day, and also tracking the annual cycle of the seasons by the length of the noontime shadow.

* The Sky Pillar is a structure designed by students at the Dalhousie University School of Architecture and erected at The Deanery Project on the Eastern Shore of Nova Scotia https://www.facebook.com/TheDeaneryProject/?mibextid=LQQJ4d. I was the volunteer astronomical consultant. It was installed last May and they are still developing the site.”

In Pursuit of Dancing Lights and Wildlife

Jason Dain's Nordic Adventures

By Jason Dain

I have always been fascinated by the northern lights. My first experience with them was while I was working as a university student north of Lake Nipigon in the mid-nineties. I was amazed by their movement and colour even without a camera. Since I have taken up astrophotography, it has been a constant quest of mine to capture the northern lights here in Nova Scotia. I have succeeded in capturing them a few times and I have learned a lot about the different variables that predict where and when they will be seen.

I often travel to the Nordic countries for work and I have taken small side trips to do some bird photography after my work is done. I have wanted to try to get up north to see the northern lights at a higher latitude but for various reasons, I have not been able to make it work.

My goal was to get up north at one of the equinoxes to take advantage of the optimal aurora viewing conditions. This timing would also allow me to do some wildlife photography during the somewhat longer days as compared to the dead of winter.

I was planning on doing a wildlife tour and seeing the northern lights next year but a number of things aligned so that I was able to do it this year instead. My trip included a few days in Helsinki, an eight-day wildlife photography trip with some aurora photography mixed in and then five days chasing the aurora from various places in Sweden, Norway and Finland.

My trip started with a few days in Helsinki so that I could get adjusted to the time zone (+5 hours) and to ensure that my checked bag made it to Finland OK. I didn't want to be going up north without all of my cold weather gear or having to buy all new stuff if my bag didn't make it in time. This also gave me a chance to do some birding in the Helsinki area with a friend that I hadn't seen since before the COVID-19 travel restrictions went into place. I arrived on Tuesday March 14 and I got settled into my hotel in Espoo, a suburb of Helsinki near my friend's house.

I had gotten into the habit of watching the aurora forecast and noted that a KP value of 6 was forecast for parts of Wednesday and overnight into Thursday. I woke up early the next morning to meet my friend and go search for some owls in various places around Helsinki. We checked out a local National Park and a few other areas in the city and found a few nice birds including my first tawny owl, a white-throated dipper and a northern hawk owl.

When we stopped for lunch, I took a good look at the updated aurora forecast and noticed that conditions still looked good for the night with clear skies and elevated levels. I checked a KP map for Finland and noted that I should be able to see the aurora in southern Finland with a storm of this strength. I hadn't planned on chasing the aurora before my wildlife tour but I decided I didn't want to pass up this opportunity. I quickly changed gears from birding mode to astrophotography mode and began preparing for the chase.

I booked a rental car for the night, grabbed some snacks for the night and found a location to shoot from with clear dark skies and a decent foreground a couple of hours north of Helsinki.

I headed north to my shooting site at around 6 p.m. local time so that I could make the trip in time for the start of astronomical twilight. Finnish roads can be tricky at times in winter with the snow and cold weather because they don't use salt or sand. All cars, including my rental car, have studded winter tires to handle the icy conditions.

When I arrived and got set up, I checked my app and noted that the KP level was only about 2 but the solar wind speed and density were elevated with a mostly positive interplanetary magnetic field (Bz).

I started capturing a time-lapse sequence with one of my cameras and noted that there was already some activity on the horizon that I could also see with my naked eye.

Over the next hour or two, the KP value escalated to 6, the solar wind speed and density rose, and the Bz value went strongly negative. This increase in activity corresponded with easily visible curtains of northern lights way above the horizon with many brilliant greens, reds and purples. I had two different cameras running time-lapses and taking stills with my cell phone.

At the peak, I was able to see the northern lights overhead and could even see them looking south. At about 4 a.m. or so, things settled down to mostly just a band of green above the horizon so I packed up and headed back to my hotel.

My first real northern lights experience was beyond amazing. I was awestruck by the display and captured over 1,000 images that night. The temperature that night just east of Tampere, Finland was below -20 C but I didn't really feel the cold as I was too busy being amazed!

After some much-needed sleep, I packed up and headed for the airport to fly from Helsinki to Ivalo, Finland to begin my wildlife tour of northern Norway. Ivalo is located in Finnish Lapland at about 68 degrees latitude. I had checked the weather and aurora conditions for that night and things looked good. After meeting the wildlife tour group and getting to our hotel we had a short briefing session about what to expect for the next eight days.

After that we discussed going out to a nearby lake to try and see some northern lights. We gathered our cameras and bundled up for a quick drive up the road to set up our gear. It was a very cold clear night and while we did see some activity, it was very cold and we had an early morning planned so we packed up and headed back to the hotel after about an hour.

The next morning, we drove north on our way to Batsfjord, Norway for our first wildlife outing. We made a quick stop at a little village called Kammanen with a great bird feeder to photograph some forest birds including pine grosbeak, redpolls, Siberian jays and some other species. We continued along the road north into Norway and into Varanger National Park to Batsfjord. Along the way we observed a number of reindeer, moose and northern hawk owls. We arrived in Batsfjord shortly after dark and got geared up for an early morning photographing ducks from a hide in the harbour. I tried unsuccessfully to convince our guide to go out and try some northern lights photography as we had to meet at 4 a.m. and we'd had a long day.

The next two days were focused on photographing ducks from a floating hide and boat in Batsfjord harbour. We had great opportunities to photograph king eider, Steller's eider and long-tailed ducks at close range in various conditions ranging from full sun to full on blizzard. We also got a boat tour of the harbour and fjord and the views of the sea and mountains were spectacular. After our second morning in the hide, we packed up and headed for Vardo, Norway for a couple of days visiting a seabird colony.

We drove south and then east along the coast of Varanger Fjord to Vardo. We made a few stops along the way for some birds and sightseeing opportunities and arrived at our hotel around 5 p.m. local time.

Like Batsfjord, Vardo was a coastal city and port and the weather wasn't really conducive for aurora photography. The next morning, we departed Vardo for Hornoya Island to visit a seabird colony that included species such as European shag, Atlantic puffin, common/Bruunich's guillemot and black- legged kittiwake.

As we approached the island, the sea and sky were covered with birds. The island hosts more than one 100,000 birds on its rocky cliffs and outcrops. For most of the day, the birds were either in the air or on the sea feeding.

Shortly after lunch, the wind and snow died down and most of the birds landed on the island. We had amazing photo opportunities of all the species up close and interacting with each other as they prepared for mating season. There were quite a few scuffles and the sound of the birds was almost deafening.

The next day we took the boat out to the island again. Conditions were quite challenging with temps around -15 C and winds blowing at 30 to 50 km/h and fairly constant snow. The birds didn't land the second day but we were still able to capture some great photos in the extreme conditions. That night, the weather forecast inland looked decent so a few of us decided to give the aurora a try. After making our way out of town through a tunnel we noted that the forecasted wind speed reduction and clearing skies were not happening so we decided to turn around before we got too far out of town.

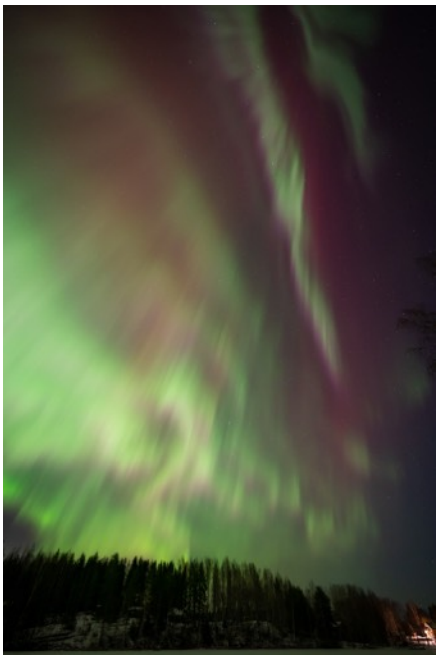
The next morning, we packed up to head back to Kammanen, Finland to wrap up our tour at the local hotel and bird feeders. We spent the day driving back along Varanger Fjord and back into Finland making several stops for wildlife and landscape photo opportunities. The weather forecast for Kammanen that night was for clear skies and a decent aurora forecast. The hotel was on a river in Bortle 2 skies so we would be able to shoot a few hundred metres away from the hotel on the frozen river.

I scouted out a good shooting spot before dinner and spent the rest of the daylight time photographing some birds around the feeders. After a nice dinner of reindeer, mashed potatoes and lingonberries, we geared up and headed out to do some Aurora photography. Like most nights, temps hovered around -20 C and there wasn't much wind.

The aurora levels were moderate so I stayed out for about three hours before finally deciding to pack it in and get ready for the next part of my trip.

After a few hours of sleep, I got up early to pack up and do some bird photography at sunrise. I had a ride booked at 9 a.m. to take me to Ivalo to pick up my rental car and continue my journey. My plan was to drive across Finnish Lapland and end up in Abisko, Sweden for the night. I had discovered this place while I was researching my trip and there was an aurora webcam there. I had noted that this place seemed to be clear quite often and saw nice shows on the webcam. It took me most of the day to drive from Ivalo, Finland to Abisko, Sweden.

Along the way, I was keeping an eye on the Aurora forecast and a major storm was being predicted for that night due to some coronal mass ejection (CME) and high-speed stream (HSS) effects. Once I got to my hotel, many sources were predicting very strong aurora for the night. I had planned to get out for astronomical twilight but was advised by a friend to get out shortly after sunrise as things were heating up quite quickly. I grabbed a quick dinner and coffee before gearing up and heading out to a nearby lake. I was at about 68 degrees latitude in Abisko so the only real foreground elements were some mountains and scrubby birch trees. I figured that I would have to wait a while to see anything as it was barely dark but to my surprise the show started almost immediately. I was able to capture the aurora with short exposures and low ISO given the bright sky and even brighter aurora.



As nautical twilight changed to astronomical twilight and into darkness, the aurora became more and more intense, reaching a peak of KP 8. The whole sky with the exception of the northern horizon was covered in many coloured curtains of light. The lights were so strong at times that they blew out the highlights on a three-second exposure. I stayed out for almost five hours that night before things started to settle down. This was by far the best night of aurora that I have experienced and was the strongest geomagnetic storm in the last six years.

Before heading to my next stop in Tromso, Norway the next morning, I decided to have a look around the village for a couple of owls that were sighted the previous day. As I passed one of the owls to get turned around, I spotted a pair of moose feeding on the side of the road.

In my excitement to get back to them, I backed my car up into the snowbank. I tried to get the vehicle out and even had some help from a local without success. I called a tow truck and watched the moose feed and then wander off while I waited. After a quick pull out of the snowbank, I went back to my hotel, packed up and headed off to Tromso, Norway. The drive to Tromso was quite dramatic up and over some pretty good mountains, through some tunnels and along a few fjords. I pulled into Tromso mid-afternoon to mostly cloudy skies and warmer temps than I had in the interior. I checked the weather for the night and it showed a bit of a break at dark but mostly cloudy skies.

After having some dinner, I gathered my gear and went down to the waterfront and shot a bit of aurora over the harbor. The weather forecast didn't make it worth driving to the sites I had scouted out with nice foregrounds. After going back to my room, I checked the weather for the next night and found it was going to be more of the same. This would be my last night to have the potential to shoot the aurora and I wanted to make sure that I had the opportunity.

I quickly changed plans to leave the next morning and travel part way back to Ivalo and stay somewhere in Finnish Lapland where the skies were going to be clear.

I chose a small hotel in Pallas-Yllästunturi National Park where the skies were quite dark and there were some nice mountains and forest for a foreground. I travelled there from Tromso and arrived there mid-afternoon. Along the way, I found some nice willow ptarmigan and whooper swans along the road to photograph.

The ski resort where I was staying was in a Bortle 2 area and had some nice groomed trails only a few hundred metres from my room where I could shoot from. I was getting pretty run down by this point in the trip with many long days and nights so grabbed a nap before heading out to shoot for the night. After gearing up and a short walk to my spot, I set up my cameras and waited for the show to begin. Aurora levels were pretty decent but the colours weren't as vibrant as some of the other nights with mostly green curtains of light dancing in the sky.

After about five hours watching the aurora, I decided to call it a night as I had to drive back to Ivalo the next morning and catch a flight back to Helsinki and go back to the real world.

In retrospect, I couldn't have asked for a better trip. I was able to achieve all of my trip goals for wildlife and aurora photography and got to experience some things that I will never forget. I think this trip has made me realize these types of experiences are something that I want to do more of in the future. I can't wait for the next opportunity to get back to Lapland to see the northern lights.

Yellowknife Aurora Hunting Trip Report

March 2023

By Jeremy Kuzub jeremykuzub@gmail.com

Hi, My name is Jeremy Kuzub. I am a member of RASC Halifax Centre, and last month completed a one-week trip to Yellowknife, NWT to photograph the aurora. This trip report covers travel, accommodation, photography and post processing of images. I am happy to answer any questions you might have on the subject of Aurora and Aurora Chasing at jerermykuzub@gmail.com. You can also visit my website CaptureNorth.com for updates on tools, techniques, and trip reports.

Why Yellowknife?

The aurora are most likely to be seen in the donut-shaped “auroral zones’ that surround Earth’s geomagnetic poles. Places like Whitehorse, Dawson City, Churchill, and Yellowknife are in this zone and aurora are more frequently visible; often they appear directly overhead even during ‘quiet’ geomagnetic conditions.

Geography

- Yellowknife is surrounded by lakes, with many aurora viewpoints close to or in town. Some notable ones include:
- The Bush Pilots Monument located on a hill near the center of town. This is a great place to get a panoramic view with the context of the city and surrounding bays. It is, however, subject to the associated light pollution.
- The Snow King Snow Castle on the Bay. Winter allows one to drive from town directly onto the bay, where houseboats are frozen-in for the winter. A snow or ice sculpture garden and snow castle make a great backdrop and daytime destination in March.
- The Detah-Yellowknife Ice Highway. Continuing past the Snow Castle, a wide, glassy winter ice road connects Detah and Yellowknife. It is an experience to drive and walk over the clear ice, and can act as an interesting photo backdrop, especially with the ice illuminated during long exposures.
- The Ingram Trail. Stretching from Yellowknife eastward about 30 kilometres is the Ingram Trail, along which are lakes that act as a great backdrop for aurora photography. Several also have picnic areas and firepits. Maps of the Ingram Trail are available at the airport for reference. In winter, some of these lakes can be walked on to set up camera gear. Generally this road is easily accessible by a rental vehicle and is well traveled by tour busses
- Ice Caves on the Back Bay. A short in-town hike to the back bay ice caves is worthwhile as a day trip. The accumulation of water dripping from the rock walls forms a large curtain of icicles.

Fall

Generally September and October are great for fall photography while the lakes are unfrozen, and the weather is more mild. There is also a day-night cycle that is close to lower latitudes at this time of year. Expect temperatures ranging down to just below freezing through -10 C at night.

Spring
March can have some stretches of clear sky and also has a day-night cycle. This time of year allows access to the ice highway, frozen lakes, and there is an accumulation of snow in non-trafficked areas around the lakes along Ingram Trail. Temperature can dip well below -20 C, so having the right clothing and keeping close to a warm vehicle is essential.

Getting There
From Halifax, I chose to take Westjet to Edmonton with a layover of about 5-6 hours, the Canadian North from Edmonton to Yellowknife. Both flights are on 737's as opposed to a more cramped flight to Yellowknife in a Q400 turboprop. Covid restrictions are no longer in place.

Accommodation
Yellowknife is a large city of over 20,000 with all the amenities, including hotels, AirBnB's and dedicated aurora-viewing oriented services like tours and lodges. I prefer getting a room or studio with a kitchen and laundry access if possible. Groceries and gas are about the same price as Nova Scotia. There is also Canadian Tire, Walmart, Staples for basic needs like forgotten camera memory cards and hand-warmers. Some notable dining places are Bollocks Bistro and NWT Brewing Company.

Transport
I rented a vehicle at the airport, reserving about 1 month in advance. I prefer an all-wheel drive vehicle. Several other companies are also available from the airport. For aurora hunting on cold days, you will likely want to run the vehicle continually to keep a warm refuge and for safety. I always make sure the vehicle's exterior lights can be fully turned off while idling so that they don't interfere with my viewing or annoy others. If you plan to park downtown during business hours to get a coffee or other activity, it is worth downloading the Passport Canada Parking app (link at end of article)

Photography Equipment
I choose to travel with compact cameras: A Sony Full Frame A7III with a Laowa 15mm f/2.0, and an all-sky camera using a Meike 6.5mm fisheye lens with a small Canon EOS-M camera, and another EOS-M with a Rokinon 12mm f/2.0. All are mounted to ball-head tripods, since the aurora can fill the sky in a few seconds. Generally I leave cameras out and on for an entire night's session to keep them from getting condensation and to keep the batteries from freezing. In the past I have also used hockey tape to secure hand warmer packs to the battery area. In all cases, the front element UV filter is removed to prevent "Newton's Rings" artifacts. Sony A7 "Z-Batteries" tend to last for almost a full night in the cold.

Wellbeing equipment
I always leave the vehicle idling for safety and refuge from the cold. It eliminates the risk of it not starting. Gloves, good boots with wool socks and, good layers and hand/toe warmers go a long way, including face and head protection beyond just a tuque. A red and white LED headlamp is very useful, as well as plenty of warm liquids in the vehicle to stay hydrated. Make sure you have the appropriate phone charger and preferable note where you do and do not have cellular coverage for emergencies.

Shooting
I generally shoot still images in RAW and JPEG simultaneously at maximum resolution. The camera is set to full manual controls with a white balance manually set to around 4000K for the JPEGs. The starting exposure I use is ISO 1600, 5 seconds at f/2.0. Be ready to reduce the exposure time to 1 second during active auroral substorms and up to 30 seconds for quiet early morning aurora.

I generally take an interval series of at least 20-100 images from a single camera position and orientation, so that I can make timelapse movies later on in post processing. For quieter aurora, longer exposures captured to stitch together in panoramics can be very rewarding, as the galaxy and stars mix with the auroral light.

For video, a full-frame camera is required, and I get acceptable (but not great) results from 24 frames per second at iso 26,000-52,000 at f/2.0. Capturing some video is very rewarding when aurora are moving and changing rapidly. In general a shorter exposure time resolves more of the fine detail in the always-moving aurora display.

Will I see the aurora?
In my experience, any clear night the aurora are visible from Yellowknife, and the aurora forecast will determine the activity level and brightness of those aurora, from a very pale, nearly featureless curtain on the north horizon, through an overhead maelstrom of motion and color across the spectrum, clearly visible to the naked eye, and lighting up the landscape around you in green hues.

The aurora varies from minute to minute and hour to hour, and may be visible anytime during the night from sunset through sunrise. Be ready for a quiet auroral arc to suddenly start to brighten over the course of minutes, and twist and churn to fill the sky. No two nights are alike. The auroral curtains generally stretch east-west, and may be across the north or south horizon or filling the sky overhead.

In general, your eye is most sensitive to green light, which is also the dominant emission in aurora. But your camera will also capture blue, violet and red hues to which your eye is less sensitive, and your back-of-camera photo reviews will generally show more color and detail than what you see in person.

Processing your photos

Processing RAW photos gets the most out of your aurora images. JPEGs do not have the colour and exposure flexibility to capture the often wide dynamic range of the auroral display, but they can act as a guide for how you decide to process the RAW images. White balance, saturation and contrast curves are open to interpretation, but I tend towards a very slight saturation boost, a slight increase in contrast, and a white balance of around 3800K. It is worth experimenting with the colour curves of red, green, and blue individually, which in turn can change the relative intensity of those auroral emissions.

Safety reminder

Yellowknife can get dangerously cold, and your vehicle can get stuck in the snow or on the ice, or simply not start after a few hours soaking in the cold. If you do not feel comfortable out on your own, start with an aurora tour company or all-inclusive lodge. Remember that camera equipment may demand gloveless fingers for the tiny buttons and touchscreens, but even a few moments without gloves can damage fingers, and touching metal tripods and lens bodies that are very cold can almost feel like getting burned! When in doubt - don't get in over your head and follow the safe aurora viewing tips from the NWT government in the link below.

More to Explore

NWT Safe Aurora Viewing Map:
https://www.iti.gov.nt.ca/sites/iti/files/final_iti_ingraham_trail_safe_aurora_viewing_locations_map_-_english.pdf

NWT Parks website https://www.nwtparks.ca/

You can have a look at my past RASC Halifax presentations on Aurora and Aurora Chasing here: https://www.youtube.com/watch?v=JZyT4t-pYTs

The June 2022 NovaNotes also has a short article on aurora chasing

Weather in Yellowknife, by month:
https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,yellowknife-ca,Canada

AurorMAX All sky image live feed of Yellowknife area sky: https://auroramax.com/live

Space Weather for auroral activity tracking: https://www.spaceweatherlive.com/en.html

Yellowknife area cloud cover forecast:
https://www.windy.com/62.450/-114.380?clouds,62.463,-114.440,8

My website CaptureNorth.com with articles on aurora chasing, equipment, and history.

Parking app:
https://www.yellowknife.ca/en/living-here/resources/Municipal_Enforcement/Passport-Canada-User-Guide.pdf

If any of you are interested in the aurora and aurora chasing, please feel free to reach out any time.

Moonscapes: Mare Humorum

By David Hoskin

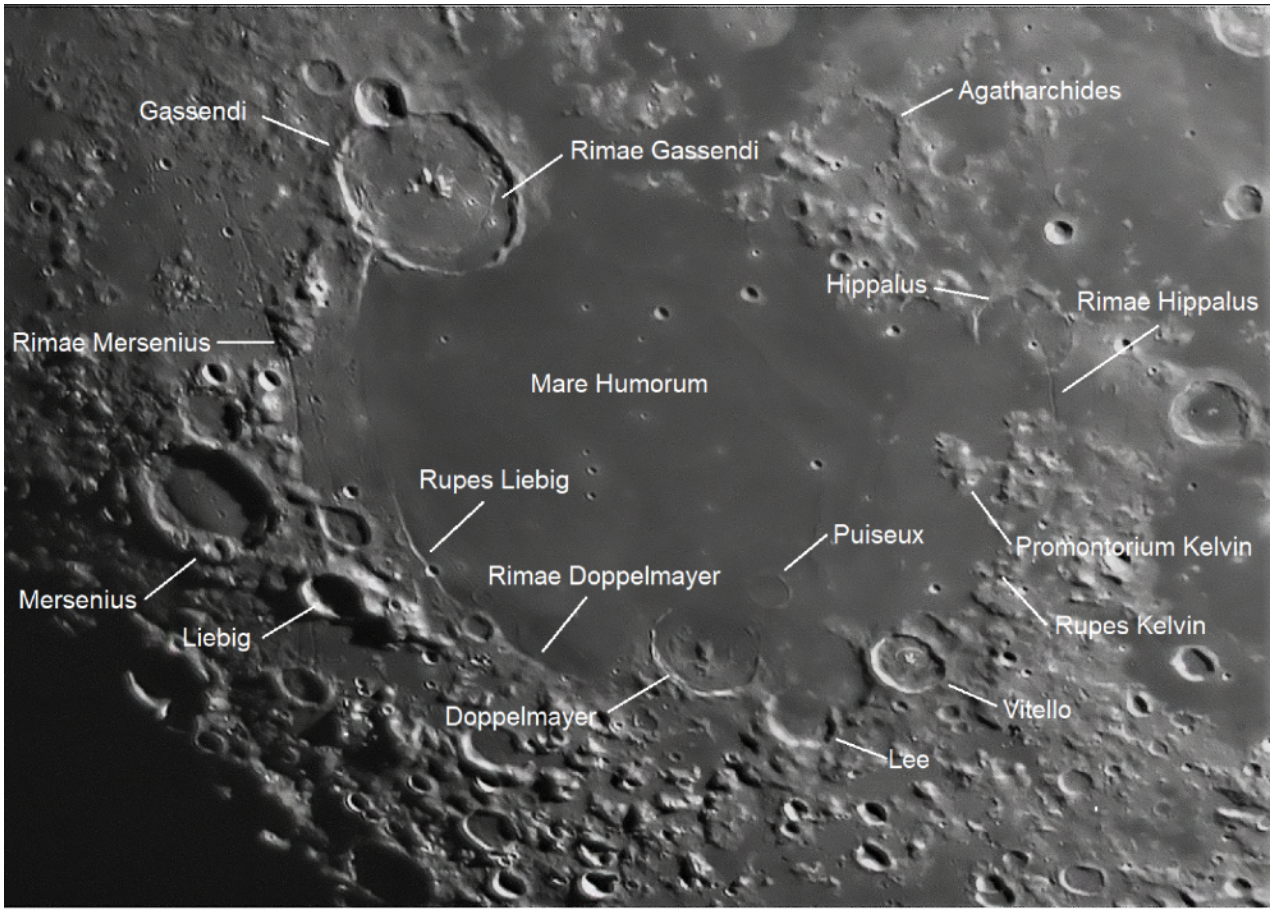
At about 825 kilometres across, Mare Humorum (Sea of Moisture – the circled area in the above image of a waxing gibbous Moon) is one of the smallest of the circular nearside lunar mare. Mare Humorum and its associated craters and other geological structures are best observed on days 10 and 11 of the lunar cycle. But early risers will be able to observe Mare Humorum on day 25 of the lunar cycle.

Mare Humorum was formed about 3.9 billion years ago, give or take 500 million years, when lava filled an ancient impact basin. The basalt of the mare is thought to be as much as three kilometres thick at the basin's centre, which is also the site of a mass concentration (mascon) that was identified in 1968 by several Lunar Orbiter spacecraft.

A mascon is a concentration of dense material beneath the lunar surface that causes a local increase in gravitational pull. Cooling of the lava formed concentric wrinkle ridges that are apparent when shadows are cast by sunlight coming from the side of the mare. The edges of Mare Humorum are delineated by mountains but in several places the lava flows extend beyond the rim of the basin - for example into the southern Oceanus Procellarum. The surface of Mare Humorum is pockmarked by craterlets.

Mare Humorum's most striking feature is the impressive 114-kilometre-wide crater Gassendi, located on the northern border of the basin. This large circular crater has walls that rise in places to a height of 3.6 kilometres but, in the south, are only a little above the level of the lava plain. Gassendi is notable for its two central peaks that tower a kilometre above its floor, as well as the floor's many rilles and ridges. The largest of these, Rimae Gassendi, is a network of cracks that are easily seen with a telescope that has an aperture of at least 150-millimetres. Interestingly, Gassendi was considered as a landing site for Apollo 17.

South of Gassendi on the western shore of Mare Humorum are several prominent rilles, including Rimae Marsenius and Rimae Doppelmayer. Rupes Liebig is a prominent cliff found near the 37-kilometre-wide impact crater Liebig. Northwest of Liebig lies the larger (84 kilometres) impact crater Mersenius. Doppelmayer crater on the southern shore of Mare Humorum is another interesting feature of the mare. Doppelmayer, which has a diameter of 64 kilometres, has been partially flooded by lava flows yet retains its large central peak. Next to Doppelmayer is the faint outline of the much smaller ghost crater Puiseux (25 kilometres), which was almost completely covered by lava. East of Doppelmayer is the partially lava-flooded crater Lee, and the low-walled 42-kilometre-wide crater Vitello, which possesses a hilly and fractured floor.



The southeast shore of Mare Humorum is marked by a mountain range known as Rupes Kelvin, named in honour of the British scientist and engineer William Thomson (Lord Kelvin). Nearby to the north lies Promontorium Kelvin, an impressive and solitary mountain that rises three kilometres above the surface of Mare Humorum.

The deep rille Rimae Hippalus, which is concentric to the eastern shore of the mare, stretches from the bay formed by partially flooded Hippalus crater (58-kilometres) to Rupes Kelvin. Rimae Hippalus can be seen with a telescope with an aperture of only 60-millimetres! At the boundary between the northeastern shore of Mare Humorum and Oceanus Procellarum lies the 49-kilometre-wide impact crater Agatharchides. The floor of Agatharchides has been resurfaced by lava flows and the crater wall to the north and south has been heavily damaged.

The many fascinating features of Mare Humorum and its immediate surroundings make this lunar mare a rewarding target for observers, even with a telescope of modest aperture.

Sources

A Guide to the Moon's Mare Humorum by Pete Lawrence, BBC Sky at Night Magazine

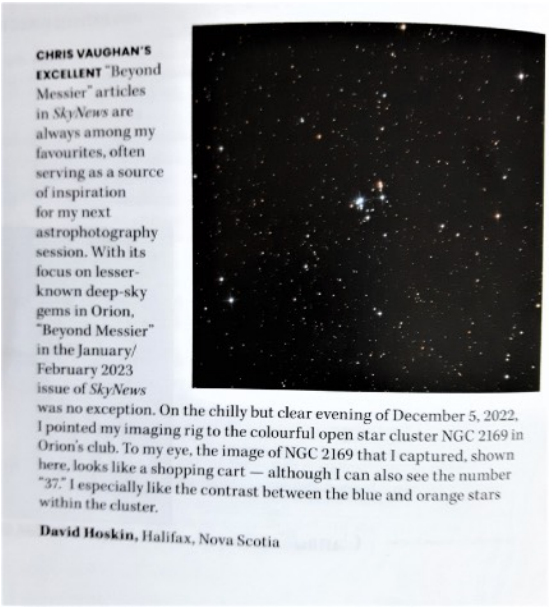
Mare Humorum - European Space Agency, sci.esa.int

Mare Humorum - Wikipedia, en.wikipedia.org

Moon Observer's Guide by Peter Grego, Firefly Books Limited

Member News

Jerry Black's photo of the Tadpoles Nebula (upper left) and Flaming Star Nebula (lower right) separated by the stars of the asterism Leaping Minnow. It was featured in the masthead for Astronomy NS February, 2023



CHRIS VAUGHAN'S EXCELLENT "Beyond Messier" articles in *SkyNews* are always among my favourites, often serving as a source of inspiration for my next astrophotography session. With its focus on lesser-known deep-sky gems in Orion, "Beyond Messier" in the January/February 2023 issue of *SkyNews* was no exception. On the chilly but clear evening of December 5, 2022, I pointed my imaging rig to the colourful open star cluster NGC 2169 in Orion's club. To my eye, the image of NGC 2169 that I captured, shown here, looks like a shopping cart — although I can also see the number "37." I especially like the contrast between the blue and orange stars within the cluster.

David Hoskin, Halifax, Nova Scotia

David Hoskin's letter to the editor and image of NGC 2169 was published in the latest (and what turned out to be the last) issue of SkyNews - bitter-sweet given the recent announcement regarding SkyNews.

David Hoskin's photo of the Beehive Cluster was used in a March 11, 2023 EarthSky article "Meet Cancer the Crab and its Beehive Cluster"
EarthSky writes: "in Halifax, Nova Scotia, Canada, captured this image on February 12, 2023. David wrote: "Messier 44 is a large, bright open star cluster in the constellation Cancer. It is also known as the Beehive Cluster or Praesepe, which is Latin for *crib*. The cluster consists of about 1,000 gravitationally bound stars." Thank you, David!"

Member News

Lisa Ann Fanning's photo appeared in a March 3, 2023 EarthSky article "Bright planets Venus-Jupiter 2023"
She caaptured this image of Venus and Jupiter on February 10, 2023. Lisa Ann wrote: "Cape May, New Jersey, is world famous for its sunsets, and tonight did not disappoint! As the sunset wrapped up, Jupiter (top) and Venus (below) started to shine brightly! A beautiful moment by the beach!"

Dave Lane "managed to snag a co-authorship thanks to **Filipp Romanov**'s work. He used my Abbey Ridge Observatory remotely to take a few hundred observations of blazar BL Lacertae as part of a worldwide effort."

He writes: "My job is keeping the equipment and software running to allow a number of remote observers to do Citizen Science work at ARO.

The paper is in the peer-review stage but as is common practice these days, early versions are published online." - February 22, 2023

The optical behaviour of BL Lacertae at its maximum brightness levels: a blend of geometry and energetics

C. M. Raiteri [1⋆], M. Villata [1], S. G. Jorstad [2,3], A. P. Marscher [2], J. A. Acosta Pulido [4,5], D. Carosati [6,7], W. P. Chen [8], M. D. Joner [9], S. O. Kurtanidze [10], C. Lorey [11], A. Marchini [12], K. Matsumoto [13], D. O. Mirzaqulov [14], S. S. Savchenko [3,15,16], A. Strigachev [17], O. Vince [18], P. Aceti [19,20], G. Apolonio [9], C. Arena [21], A. Arkharov [16], R. Bachev [17], N. Bader [11], M. Banfi [19], G. Bonnoli [22], G. A. Borman [23], V. Bozhilov [24], L. F. Brown [25], W. Carbonell [25], M. I. Carnerero [1], G. Damljanovic [18], V. Dhiman [26,27], S. A. Ehgamberdiev [14,28], D. Elsaesser [29,11], M. Feige [11], D. Gabellini [30], D. Galán [5], G. Galli [31], H. Gaur [26], K. Gazeas [32], T. S. Grishina [3], A. C. Gupta [33,34,26], V. A. Hagen-Thorn [3], M. K. Hallum [2], M. Hart [2], K. Hasuda [35], K. Heidemann [11], B. Horst [11], W.-J. Hou [8], S. Ibryamov [36], R. Z. Ivanidze [10], M. D. Jovanovic [18], G. N. Kimeridze [10], S. Kishore [26,37], S. Klimanov [16], E. N. Kopatskaya [3], O. M. Kurtanidze [10,38,39], P. Kushwaha [40,26], D. J. Lane [41], E. G. Larionova [3], S. Leonini [42], H. C. Lin [8], K. Mannheim [43,11], G. Marino [21,44], M. Minev [24,17], A. Modaressi [25], D. A. Morozova [3], F. Mortari [30], S. V. Nazarov [45], M. G. Nikolashvili [10], J. Otero Santos [4,5], E. Ovcharov [24], R. Papini [44], V. Pinter [46,47,48], C. A. Privitera [12], T. Pursimo [46,47], D. Reinhart [11], J. Roberts [9], F. D. Romanov [49,50], K. Rosenlehner [11], T. Sakamoto [35], F. Salvaggio [21,44], K. Schoch [11], E. Semkov [17], J. Seufert [11], D. Shakhovskoy [45], L. A. Sigua [10], C. Singh [25], R. Steineke [11], M. Stojanovic [18], T. Tripathi [26,37], Y. V. Troitskaya [3], I. S. Troitskiy [3], A. Tsai [8], A. Valcheva [24], A. A. Vasilyev [3], K. Vrontaki [32], Z. R. Weaver [2], J. H. F. Wooley [9], E. Zaharieva [24], and A. V. Zhovtan [45]
Affiliations are listed at the end of the paper

Accepted XXX. Received YYY; in original form ZZZ

ABSTRACT

In 2021 BL Lacertae underwent an extraordinary activity phase, which was intensively followed by the Whole Earth Blazar Telescope (WEBT) Collaboration. We present the WEBT optical data in the *BVRI* bands acquired at 36 observatories around the world. In mid 2021 the source showed its historical maximum, with $R = 11.14$. The light curves display many episodes of intraday variability, whose amplitude increases with source brightness, in agreement with a geometrical interpretation of the long-term flux behaviour. This is also supported by the long-term spectral variability, with an almost achromatic trend with brightness. In contrast, short-term variations are found to be strongly chromatic and are ascribed to energetic processes in the jet. We also analyse the optical polarimetric behaviour, finding evidence of a strong correlation between the intrinsic fast variations in flux density and those in polarisation degree, with a time delay of about 13 h. This suggests a common physical origin. The overall behaviour of the source can be interpreted as the result of two mechanisms: variability on time scales greater than several days is likely produced by orientation effects, while either shock waves propagating in the jet, or magnetic reconnection, possibly induced by kink instabilities in the jet, can explain variability on shorter time scales. The latter scenario could also account for the appearance of quasi-periodic oscillations, with periods from a few days to a few hours, during outbursts, when the jet is more closely aligned with our line of sight and the time scales are shortened by relativistic effects.

Key words: galaxies: active – galaxies: jets – galaxies: BL Lacertae objects: general – galaxies: BL Lacertae objects: individual: BL Lacertae

Members' Universe

Jerry Black "The Leo Triplet comprised of M65, M66 and NGC 3628. Messier 65 (center right, also known as NGC 3623) is an intermediate spiral galaxy about 35 million light-years away in the constellation Leo, within its highly equatorial southern half. It was discovered by Charles Messier in 1780. With M66 (an intermediate spiral galaxy, above) and NGC 3628 (also known as the Hamburger Galaxy) an unbarred spiral galaxy about 35 million light-years away, they form the Leo Triplet, a small close group of galaxies.

Lower Sackville, Nova Scotia 2023-02-28 & 2023-03-12

Exposure 25@1200 sec (8 hours 20 min.) /ISO 3200 Nikon Z7 [8856 x 5504] / Skywatcher Esprit 120mm Refractor, 840 mm focal length/ Filter Triad Quad Utra Narrowband / Guiding KStars internal guiding using a ZWO 224MC on an Orion 60x240mm Guide scope Images taken using Kstars on an MeLe Quieter 3C running Ubuntu 22.04.2

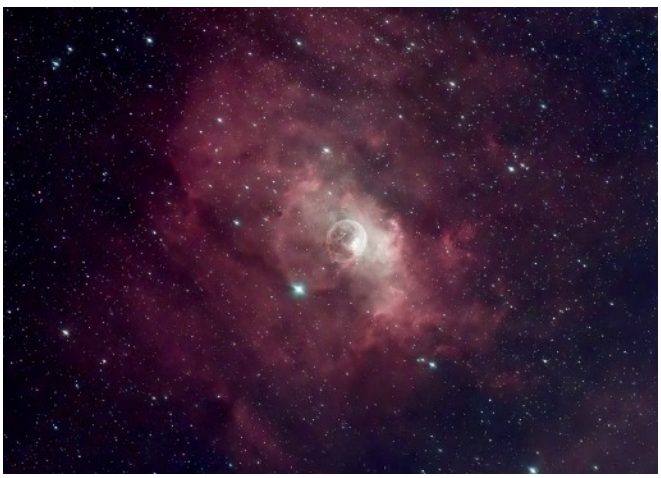
Processing: PixInsight, WeightedBatchPreprocessing Script, Background Extractor, NoiseXTerminator, BlurXTerminator, HistogramTransform, StarXTerminator, CurvesTransformation, PixelMath

Jerry Black "NGC2359 Thor's Helmet is an emission nebula in the constellation Canis Major. The nebula is about 12 thousand light years away and 30 light-years in size. The central star is the Wolf-Rayet star WR7, an extremely hot star thought to be in a brief pre-supernova stage of evolution.."

Lower Sackville, Nova Scotia 2023-03-21

Total image time was 2 hours.
Exposure 6x20 min./ ISO 3200 / Nikon Z7 [8856 x 5504] / Optics 120mm Skywatcher Esprit on a Celestron CGX mount / Guiding ZWO ASI224MC using Phd2 / Controller Kstars on MeLe Quieter 3C /Filter Triad Quad Ultra

Processing: PixInsight., Dynamic Background Extractor, BlurXTerminator,
NoiseXTerminator, ScreenTransfer Stretch,
StarXTerminator, CurvesTransformation,
PixelMath, Further processing in Lightroom



Jerry Black "The Bubble Nebula (NGC 7635) in the constellation Cassiopeia. The "bubble" is created by the stellar wind from a massive hot 7.8 magnitude young central star. This image includes the bright nebula NGC 7538 at the top, and NGC 7510 to its right. M52 (NGC 7654) is at the bottom left. I haven't been able to find a name for the nebulosity on the right hand side of this image. [Edit - the Lobster Claw Nebula SH2-157 is nebula on the right side of the image]

Lower Sackville, Nova Scotia 2019-09-07

Total image time was 8 hours/ Exposure 24x20 min./ ISO 800 / Nikon Z7 [8856 x 5504] / Optics120mm Skywatcher Esprit on a Celestron CGX mount / Guiding ZWO ASI224MC using Phd2 / Controller Kstars on Odroid-N2 Filter Triad Quad Ultra

Processed in PixInsight and Lightroom and Topaz Photo AI.

Members' Universe: David Hoskin's Universe

David Hoskin writes "Markarian's Chain is a string of galaxies that are part of the Virgo Cluster of galaxies. Imaged from Halifax over 2 nights." February 27, 2023

David Hoskin writes "Messier 37 is a bright and densely packed open star cluster in the constellation Auriga. This beautiful deep sky object contains over 500 stars and is about 4,500 light years from Earth."

David Hoskin writes: "Messier 41, also known as The Little Beehive Cluster, is an open star cluster located in the constellation Canis Major. The cluster, which is comprised of about 100 stars, is approximately 190 million years old.

Details: Captured using a ZWO ASI183MC camera and UV/IR cut filter on a RedCat51 astrograph/iEXOS 100 mount. Subs (19 1min) plus calibration frames were stacked with DeepSkyStacker. Post-processing used Siril, Photoshop and Microsoft Photo."

David Hoskin writes: "Messier 46 (left) and Messier 47 (right) are open star clusters located in the constellation Puppis. Messier 46 is about 5,000 light years from Earth and over 250 million years old. A small planetary nebula, NGC 2438, is visible near the top centre of Messier 46. Messier 47 is closer (1,600 light years) and younger (78 million years) than Messier 46. There are about 500 stars in each cluster."

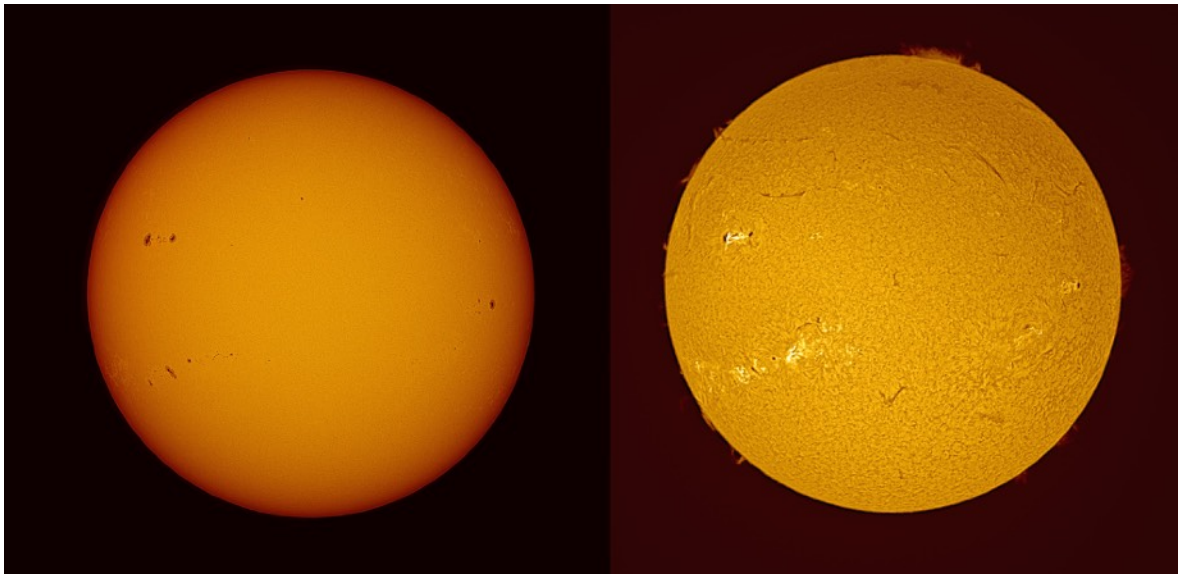
Members' Universe: David Hoskin's Universe

David Hoskin writes: "Messier 48 is an open star cluster located in the constellation Hydra. The cluster, which contains at least 438 stars, is located about 2,500 light years from Earth. Details: Captured using a ZWO ASI183MC camera and UV/IR cut filter on a RedCat51 astrograph/iEXOS 100 mount. Subs (10 3min) plus calibration frames were stacked with DeepSkyStacker. Post-processing used Siril, Starnet++, Photoshop and Microsoft Photo."

David Hoskin writes "SN 2023dbc (at the intersection of the white lines in the inset) is a fairly dim type II supernova in Messier 108, also known as the Surfboard Galaxy. Messier 108 is about 28 million light years from Earth. SN 2023dbc was discovered by the Zwicky Transient Facility on 13 March 2023. At the time of its discovery, the Supernova was magnitude 17.4 but dimmed to magnitude 19 by early April. SN 2023 dbc is red because of dust in Messier 108."

David Hoskin writes "The close approach of Mars to the first-quarter Moon, along with a cloudless sky, prompted me to brave the minus 15 degrees Centigrade temperature to capture this composite image of the conjunction." (February 27, 2023)

David Hoskin imaged the Waxing gibbous Moon on April 2, 2023



Sun White Light and Ha (April 15, 2023)
David Hoskin writes: “There were 8 sunspot groups visible on the Sun today, which are best seen in the white light image on the left. The largest of these is AR3282 (top left). The hydrogen alpha image on the right shows numerous prominences and filaments as well as the 8 sunspot groups and areas of plage.”

Members’ Universe
Food for the Soul: The Poetry of Paul Heath

Dancing Souls

~ Paul Heath ~

Mystic emerald green
Flows and ripples on a starlit sky,
Ethereal curtains in undulating waves
Sweeps away the starlight.
Spell bound Eyes look upwards.

To Warriors, the Valkyrie’s charge
Souls collecting,
To ice bound hunters
A game their Ancestors play upon the skies,
Spell bound Eyes look upward.

In whispers, they shy away
Fearful lonely Ancestors, away will sweep,
Bad omens filling darkened skies
The Ethereal motion mystifies.
Spell bound Eyes look upward.

Life’s need, is electrified
Our sustaining light’s outburst is revealed,
In mystic green or ethereal whites
At times, blood wash blocks the stars at night.
Spell bound Eyes look upward.

Brief, yet so alluring
The pulsing, rippling Mystic emerald green
The waves of Ethereal white curtains,
Just Dancing Souls before our upturned Eyes.

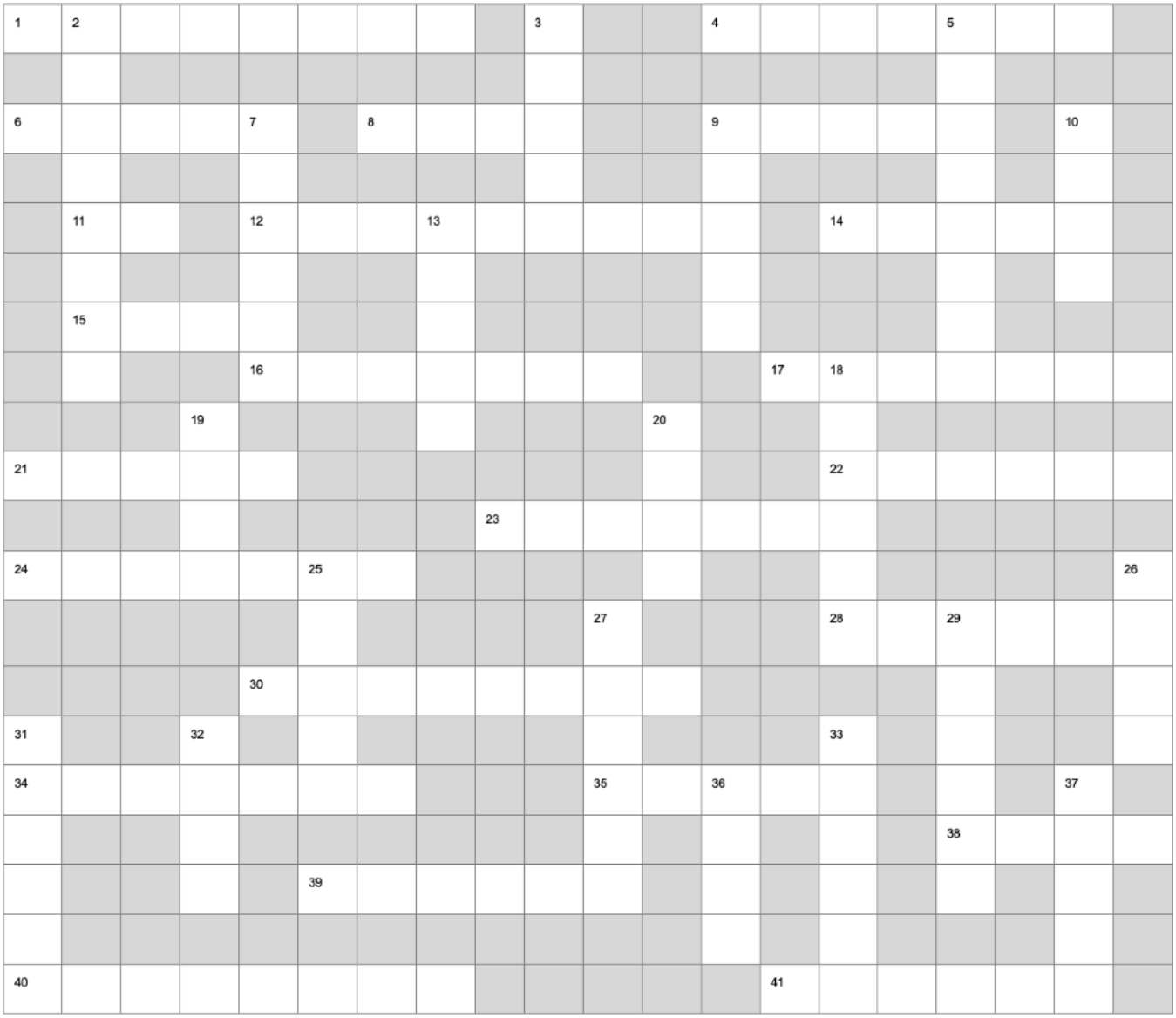
PUZZLE CORNER – Members of the Solar System

(See next page for clues)

Astro Cross Words

By Laureen Burgoyne & Norman Scrimger
Reprinted from *Nova Notes 1982, Vol 13(4)*

Astro Cross Words became a regular feature in *Nova Notes.* Five puzzles were provided to members over the course of a year's editions. Each puzzle had a common astronomical theme. This, the fourth one published, is *Members of the Solar System*. Laureen Burgoyne and Norman Scrimger, the creators of the puzzle series, noted that "this puzzle contains the names of various members of the solar system, from planets and their moons to asteroids and comets." Good luck to everyone! Answers will be in the next edition of *Nova Notes* (no cheating by those with access to previous *Nova Notes* editions).



Across

1) First Trojan asteroid to be discovered
4) Sixth Moon of Jupiter found
6) Roman god of the underworld
8) Fifth companion to Jupiter's father
9) Aphrodite
11) Hottest of Jupiter's lovers
12) This giant (companion to Saturn) lies under Sicily
14) Name given to the 12 early giants
15) Spanish for "bull"
16) Roman god of the sea
17) Shakespeare's Queen of the Fairies
21) This first asteroid was discovered by Giuseppe Piazzi
22) Innermost and smallest of the retrograde moons of Jupiter
23) King of the gods
24) Companion to Uranus also takes good pictures
28) First moon Nicholson ever discovered
34) Moon discovered by Ariel
35) Nearest named moon to Saturn
38) Near earth-crossing asteroid 1627
39) Second asteroid discovered
40) Small sulphur-coated rock in orbit around Jupiter
41) Fifth largest satellite of Saturn

Down

1) Second largest of the Galilean Moons
2) By Zeus, the mother of Tityus
5) One of two moons discovered by Nicholson in 1938
7) Married to 17) across
9) Bright asteroid found in Capricornus in 1982
10) Roman name for Zeus' queen
13) home sweet home
18) Fellow who flew too close to the sun
19) Satellite of Jupiter discovered in 1974 by Kowal
20) Tall, elegant flower
25) Mother of 9) across
26) Comet not-east
27) Moon whose name mean s "terror"
29) Moon having a period of at least one year
31) Another of Jupiter's mistresses
32) Near Earth-crossing cupid
33) Became the mortal bride of 32) down
36) Roman name for the Greek god Ares
37) Moon discovered by Dollfus, 1966

Answers to Last Edition's Puzzle

March 4, 2023 RASC Halifax Centre Meeting:

(44 attendees)
To watch a replay of the meeting, please visit: https://youtu.be/6_YShCCeS7c on the RASC Halifax YouTube Channel.

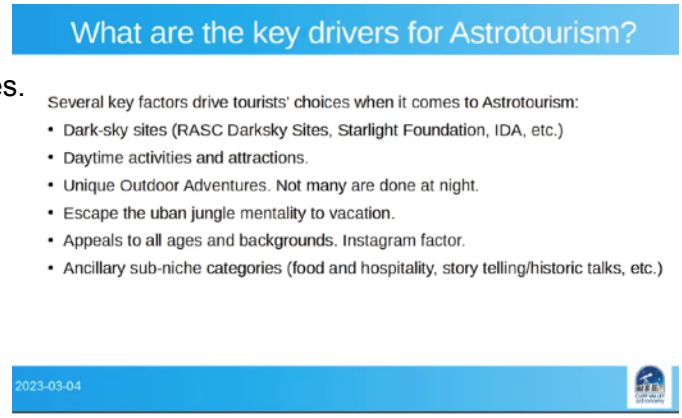
Welcome - Judy Black

RASC Halifax Director and program emcee Judy Black welcomed everyone to the monthly meeting, explained the benefits of membership and reviewed the agenda. She acknowledged the Indigenous lands in which the meeting was held and read the Centre's inclusivity and diversity statement.

David Hoskin - Photo Montage

David presented photographs and sketches from Centre members Jerry Black, Michael Boschat, Barry Burgess, Dave Chapman, Jason Dain, Jeff Donaldson, Tim Doucette, Lisa Ann Fanning, Jeffrey Franklin, Paul Gray, Bruce Hamilton, David Hoskin, Pat Kelly, Blair MacDonald, Gaurav Singh, Brian Smith and Kathy Walker.

Stéphane Picard (New Brunswick Centre) - Astrotourism - Creating new opportunities in an industry ever more reliant on creating experiences.



Stéphane Picard (New Brunswick Centre) - Astrotourism - Creating new opportunities in an industry ever more reliant on creating experiences. Journey as an entrepreneur in astrotourism. The road to create awareness, support and activation with a business community and government agencies and NGOs. Stéphane rediscovered his passion for astronomy after a hiatus of almost 20 years at the start of the Covid pandemic. Throughout the lock-downs he began dabbing in astrophotography. As the need for equipment increased so did the expenses. This led to him consider using his passion for the hobby to generate some revenue to afford the ever increasing investment level. With 25 years experience in business and marketing, this venture became known as Cliff Valley Astronomy which he launched in early April 2022. Initially offering Private Star Parties for small groups, it was understood that astrotourism would be an important aspect of business to develop. Its first year has proven successful on the surprising strength of private star parties bookings. This has allowed him to reinvest and prepare astrotourism services set to launch next month. His biggest endeavour involves creating a destination event coinciding with the most important astronomical event in over 50 years.

Chris Young (Halifax Centre) Sky Lore

In this interesting installment of Sky Lore from around the world, Chris takes us to southwestern South America and examines the connection between potato farming, El Niño and the Pleiades.

David Hoskin (EPO/Observing Chair) - What's up for March. 2023

David reviewed highlights of the March sky. Days are getting longer! (And don't forget about Daylight Saving Time and the March 20 equinox.) He highlighted the sun, solar activity, the Moon, and targets needed to check off for Explore the Universe, and when they can be viewed. He also highlighted planetary positions, constellations, stars (including double and multiple) and deep sky objects. Also highlighted were zodiacal light and the Messier Marathon.
Each month, you can find David's presentations on the homepage at http://halifax.rasc.ca

News from the Board presented by Pat Kelly

- Governance: A new treasurer has been named. Jaimie Whynot has had to step down. Dave Lane has been appointed new treasurer.

- Two Policies were updated:
  - G3: Signing Authority (adding an extra director to physically sign checks.)
  - G7: Website Operations (standardized website operations)

- Calendars are still available for purchase for $25 by e-transfer to treasurer@halifax.rasc.ca or you can send a check to the treasurer.

- Green Laser Pointer Training (GLPT) is coming soon! Dennis Lyons from Winnipeg Centre will lead a session to train folks to train centre members. An exam will be administered, and the centre will track the status of certification for those who apply, and ensure refresher courses are made available.

- Centre Stars:
  - ★Thank you Dave Lane & Tony McGrath for their role in bringing electric heat to St. Croix!
  - ★David Hoskin's image of Comet ZTF was shown on CTV Atlantic News
  - ★Tim Doucette & Deep-Sky Eye was featured on Wild Nova Scotia on Eastlink Community TV
  - ★Jennifer and John Read were recognized for their book 50 Animals That Have Been to Space by the Junior Library Guild as a Gold Standard Selection
  - ★Jerry Black's photo of The Tadpole and Flame Nebulas was selected as the masthead for the Astronomy Nova Scotia site.
  - ★Dave Lane was noted in a paper about BL Lacertae for the role his Abby Ridge Observatory played in gathering data for the research.
  - ★David Hoskin for his letter to the editor that was published in SkyNews on NGC 2169 in response to Chris Vaughan's article on Beyond the Messier List.
  - ★Lisa Ann Fanning's photo of Jupiter and Venus taken from Cape May, NJ was featured in an EarthSky article about the two planets.

Upcoming Events:
Members' Meetings

- April 1
- May 13 (changed due to the May 5-7 RASC GA)
- June 3
- RASC AGM will be held on June 25
- Sept. 9

Other events:

- Kejimkujik Dark Sky Weekend will be held August 11 - 13. 2023
- 2023 Nova East will be held August 18 - 20, 2023 (New Moon is August 16)
- 2023 St. Croix BBQ will be held Friday September 16 / rain date September 16

April 1, 2023 RASC Halifax Centre Meeting:

(34 attendees)
To watch a replay of the meeting, please visit:https://youtu.be/JZyT4t-pYTs on the RASC Halifax YouTube Channel.

Welcome - Judy Black

RASC Halifax Director and program emcee Judy Black welcomed everyone to the monthly meeting with a special April fools greeting as well as sharing the history of the day, she also explained the benefits of membership and reviewed the agenda. She acknowledged the Indigenous lands in which the meeting was held and read the Centre's inclusivity and diversity statement.

David Hoskin - Photo Montage

David presented photographs and sketches from Centre members Jerry Black, Michael Boschat, Barry Burgess, Dave Chapman, Jason Dain, Lisa Ann Fanning, Jeffrey Franklin, Melody Hamilton, David Hoskin, Gaurav Singh, and Kathy Walker.

Paul Heath - Food for the Soul - *Dancing Souls*

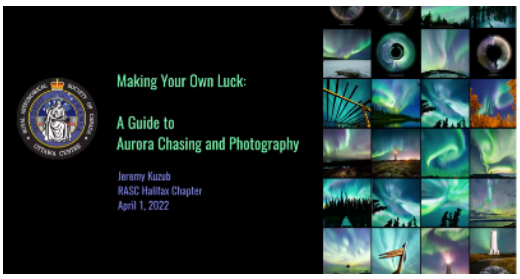
Paul presented his wonderful poem in honour of the aurorae, which can be read on page 22 of this edition of Nova Notes.

Special Presentations:
Tarek El Wazzi (Halifax Centre) - *Lebanon: nightlife of a different genre*

Lebanon is mainly known for its food, nightlife, historical sites, civil war and for the past couple of years its economic, financial and security downfall. Worst of all was the August 4 2020 explosion. Through this presentation, Tarek shows how he and others managed to grow and evolve this genre of photography in Lebanon by displaying the photos he captured throughout these years and sharing the stories and experience behind each of them. This hobby has given him unforgettable experiences, some scary and frightening but most have been of joy, happiness and elation.

Jeremy Kuzub (Halifax Centre) - *Making your Own Luck: A Guide to Aurora Chasing and Photography*

On many people's bucket list is the experience of looking up to see a sky filled with aurora, and to be able to capture and share this experience. Jeremy will present on the art, science, and excitement of aurora chasing and how you can make the most of the experience. His presentation will cover aurora forecasting, science, photography equipment, and a travel-log of some of his experiences in the north.



David Hoskin (EPO/Observing Chair) - What's up for April. 2023

David reviewed highlights of the April sky. He highlighted the sun, solar activity, the Moon, and targets needed to check off for Explore the Universe, and when they can be viewed. He also highlighted planetary positions, constellations, stars (including double and multiple) and deep sky objects. Also highlighted were zodiacal light and the Messier Marathon.
Each month, you can find David's presentations on the homepage at http://halifax.rasc.ca.

Also, April 29 is International Astronomy Day, and RASC will have a booth at the Discovery Centre - volunteers are welcome.

News from the Board presented by Pat Kelly

Governance: National Elections are upcoming - there are open positions for four directors. Nominations deadline has been extended to April 21, 2023

Centre Stars:

- ★David Chapman's image via the Robotic Telescope of Ceres was featured in EarthSky.
- ★David Hoskin's image of M44 (the Beehive Cluster) was featured in an article about the constellation Cancer.

Upcoming Events:
Members' Meetings:

- May 13 (changed due to the May 5-7 RASC GA)
- June 3
- Note: The RASC AGM will be held on June 25
- September 9 (NOT Labour Day weekend)

Kejimkujik Dark Sky Weekend will be held on August 11-13. 2023

Other events:

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