Newsletter of the Royal Astronomical Society of Canada Winnipeg Centre January / February 2023

Winnicentrics

The Royal Astronomical Society of Canada - Winnipeg Centre

Regular meetings of the Winnipeg Centre are held in the Robert B. Schultz Lecture Theatre in St. John's College at the University of Manitoba, 92 Dysart Road. Free parking is available in the lot across the street. The theatre is on the lower (basement) floor of the College. Meetings are usually held on the second Friday of each month from 7 p.m. to 10 p.m. After the meetings, members who wish to do so usually retire for pizza and more conversation about astronomical subjects. The meetings moving forward will also be available via Zoom, Facebook, and Youtube.

Upcoming Events

RASC Winnipeg Centre Monthly Meetings

Friday, Jan. 13, 2023
Friday, Feb. 10, 2023

Members' Observing Nights

Saturday, Jan. 14, 2023
Saturday, Feb. 11, 2023

Oak Hammock Marsh Astronomy Nights

Thursday, Jan. 19, 2023
Thursday, Feb. 16, 2023

(see oakhammockmarsh.ca for details and admission)

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YouTube

https://bit.ly/2FrcZJZ

https://bit.ly/3iSmFed

Winnipeg Centre Officers & Volunteers

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Vice-President: Judy Anderson
Secretary: Ed Wright
Treasurer: Abdul al Manni
Past President: Bryan Stach

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Russell Brown
Mike Karakas
Marc Sarrasin
Scott Young

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Dennis Lyons & Bryan Stach

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Russell Brown

Webmasters:
Marc Sarrasin
Russell Brown

Winnicentrics Editor:
Scott Young

Winnicentrics is published six times or more each year by the RASC Winnipeg Centre. *Winnicentrics* is produced by and for the members of the Winnipeg Centre.
Any opinions expressed are those of the author. Any questions or comments please email:
editor@winnipeg.rasc.ca
Or contact one of your Councillors above

Quick Notes

The Glenlea Observatory LX200 / Dome is OPEN! Please contact **observatory@winnipeg.rasc.ca** for current info, assistance, or to request training on the telescope and dome. Glenlea Warm Room and Pad are OPEN but please observe any Public Health requirements in effect. There is a portable toilet on site at present, pending repairs to the dome building.

Meetings are now hybrid virtual and in-person events at the Robert B. Schultz Lecture Theatre in St. John's College at the University of Manitoba Fort Garry campus. Those members attending virtually can do so by using Zoom – a link will be emailed the week of the meeting. The meeting will also be livestreamed to our Facebook and YouTube sites. If you are attending in-person, please ensure that you bring a mask and wear it when coming into the building. The University has a continuing mask mandate on campus described at https://umanitoba.ca/covid-19/health-safety. Boston Pizza after-meeting social events are in-person again.

Members Observing Nights are held the Saturday night after the Monthly meeting (weather permitting) at the observatory.

Visit our web site at:
www.winnipeg.rasc.ca

Visit our Facebook group at:
www.facebook.com/groups/rascwinnipeg

President's Corner

By Dennis Lyons, RASC Winnipeg Centre President

Hello everyone,

As I sit writing this, we are closing out a year and about to begin another. This past year has been good as all of us have been able to get out together under the night sky to enjoy astronomy. We moved from only online meetings to a combined in-person and online hybrid that allows everyone to join in. A big thank you to Scott, Ed, and others for making this happen. The RASC Winnipeg Centre membership passed the revised bylaws at the beginning of the year paving the way for Incorporation.

Council has worked on developing and documenting policies and procedures to support the Bylaw. A calendar of things to do as a Council has been developed to assist current and future Councils in what needs to be done during the year. Council has been working on a recovery plan for the Glenlea Observatory since it flooded this year. These and many other things have happened this year including many of the members hosting public outreach mini star parties, and not to forget the Spruce Woods Star Party where Spruce Woods Provincial Park has been formally recognized as a Dark Sky Preserve, the first in Manitoba. Finally, the Centre ran its third annual "Telescopes for Kids" event and awarded first telescopes to five aspiring young astronomers.

What may the next year hold for the Centre? Well to start with the AGM with elections and appointments as well as a vote on Incorporation. There are also several appointed positions available for volunteers, and many hands make light work – please speak to a member of Council if you'd be interested in volunteering for the Centre.

The vote to incorporate is another step in the growth of the RASC Winnipeg Centre. There are many benefits to being incorporated. Being incorporated allows the Centre to exist as its own entity separate from the members, makes it eligible for funding and partnership opportunities, and allows some members' employers to donate to the Centre for their volunteer hours. Perhaps most importantly, an incorporated Centre helps to protect the group and its assets.

Other goals are to complete the policies and Procedures Manual, continue to do a review on the Observatory, normalize the Centre's relationship with the University of Manitoba and continue working with the Nature Conservancy of Canada on achieving recognition of another Dark Sky Preserve in Southern Manitoba. These and other projects are available, and only need you to volunteer where you can to make it happen.

Happy New Year,

Dennis Lyons

Editor's Message

By Scott Young, RASC Winnipeg Centre

Hello, folks! I'm excited to begin a term as the incoming Editor of *Winnicentrics*. Before anything else, I want to thank outgoing Editor Gord Tulloch, who was recently awarded the Centre's Service Award for his contributions to the Centre over many years. In addition to serving as *Winnicentrics* Editor, Gord has been webmaster, presenter of both beginner's session and featured talks at our monthly meetings, an active outreach volunteer, a member of the Centre's council, chair of the observatory committee, archivist… and a bunch of other things I'm probably leaving off the list. He has been an active and important member of our community both in the public eye and behind the scenes. We all owe Gord our thanks for pushing so many Centre projects forward with what seems like boundless energy.

Filling such shoes is somewhat daunting, but I have one slight edge: this isn't my first time in the Editor's chair. I took over *Winnicentrics* once before, a number[1] of years ago, when it was still put together with paper, and "cut and paste" involved scissors and glue. Back then, I was an unruly young guy[2] who had just decided astronomy education would be my career, and the Winnipeg Centre had been a big influence in that decision. Now, it's nice once again to be able to volunteer for the Centre that has been such a formative part of my life. I hope I can do the last hundred years[3] of previous Editors proud.

As the "new guy", I'll be looking for input on what the members want out of *Winnicentrics*. It serves first and foremost as a forum for members to share their words[4] and astronomical images, whether it be in a short paragraph or a multi-issue series. In this issue, we're thrilled to have Dr. Michelle Boyce begin her exploration of solar observing and imaging, and we have some great images and sketches from members of the Centre. There is room for many more members' stories, articles, or images, and not only by the experts. I often find myself inspired by reading someone's story of their first telescope experience or seeing their first image, even if it isn't as technically advanced as others. Please consider sharing some of your stories with your fellow members.

What else can *Winnicentrics* be for our group? Members already receive *SkyNews*, which covers the month-to-month happenings in the sky, so there is no need to repeat that information in these pages. But perhaps a more in-depth look at a selected event or two would be useful in planning? Equipment reviews? Imaging or visual observing challenges? What do you want *Winnicentrics* to be?

You can reach me at editor@winnipeg.rasc.ca to discuss your ideas. I'd love to hear from you!

- Scott

[1] A considerable number. More than 25.
[2] Still unruly, just not as young.
[3] The Centre formed in 1910, and there is evidence of a newsletter of sorts from the early days. I'm not sure when it became "*Winnicentrics*", though.
[4] Nice words, inspiring words, educational words, kind words. No mean words are currently allowed by our editorial policy.

Observing the Sun, Part One

By Dr. Michelle Boyce, RASC Winnipeg Centre

In this 4-part series we will be discussing our sun as it relates to solar observing: i.e. the sun, solar equipment, solar photography, and solar observatories.

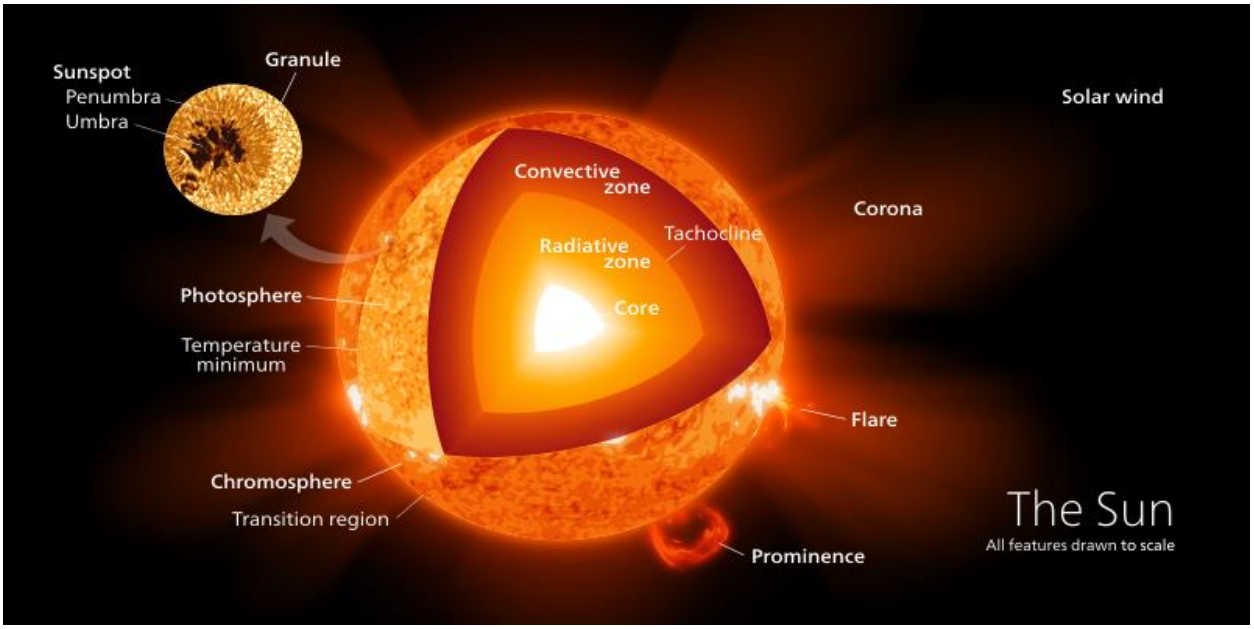


Figure 1. Anatomy of the Sun. (*Image Credit: Kelvinsong, CC BY-SA 3.0, via Wikimedia Commons*)

Our sun is a hot ball of mostly hydrogen gas (i.e. 91.2% hydrogen, plus 8.7% helium, and traces of other elements) forever wanting to explode, but held back from doing so by its own gravity, balanced in a state of hydrodynamic equilibrium. The sun is roughly 330,000 Earth masses, predominantly from protons (hydrogen nuclei) which are 2,000 times more massive than electrons. Its surface is defined by the *photosphere*, the layer of the Sun where light (or photons) can escape. The photosphere is roughly 700,000 km (or 110 Earth radii). In the sky, the sun is roughly the same angular size as the moon, about ½ degree.

The photosphere is only about 500 km thick, and defines the "edge" of the sun (i.e. the limb that we see). It is visible to amateur astronomers by using a white light solar filter or other specialized techniques and more advanced equipment which will be discussed in the next article. A warning: the sun's light is so intense that looking at it with binoculars or a telescope can result in instant and permanent blindness!

Above the photosphere extends the invisible *chromosphere* (about 1,500 km thick), the *transition zone* (8,500 km thick), and ghostly *corona* (usually only seen during a total solar eclipse). Beyond this, the solar wind emanates into the solar system. The photosphere and chromosphere are regions accessible to amateur astronomers through white light solar filters, Herschel wedges, hydrogen-alpha (or Hα) filters, etc., which will be discussed in the next article. The solar wind consists of streams of charged particles and is responsible for space weather, whereupon events, such as solar flares, can result in beautiful auroras and/or disrupt electrical equipment.

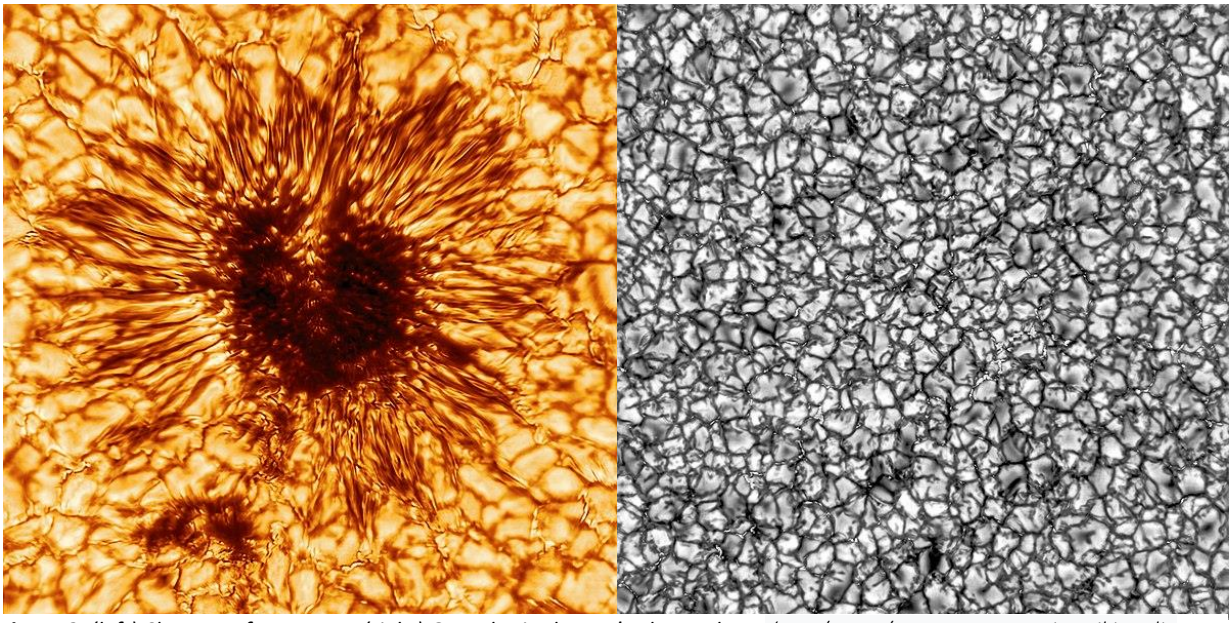


Figure 2. *(left) Close-up of a sunspot; (right) Granules in the sun's photosphere. (NSO/AURA/NSF, CC BY 4.0, via Wikimedia Commons)*

A common sight within the photosphere are dark spots called *sunspots* (see Fig.2). These are slightly cooler regions which appear dark only by contrast with the photosphere.

Extending inwards from the photosphere is the *convection zone* (a layer under the photosphere 200,000 km thick), the *radiative zone* (300,000 km), and *core* (200,000 km). The core is so dense that thermonuclear fusion takes place, with hydrogen is being fused into helium, releasing tremendous amounts of energy.

We often hear that the sun is "burning gas", but this is not technically true. In actuality, the sun consists of a fourth state of matter, known as a *plasma* (an ionized gas), which is composed of charged particles such as protons (hydrogen nuclei), alpha particles (helium nuclei), and electrons. The core's heat energy is radiated by photons passing through the radiation zone, kinetically heating it up as they scatter off charged particles. This kinetic energy is then transported by layers of convection cells in the convection zone. The roughly 1,000 km-sized *granules* (lasting 5 to 10 minutes) seen on the sun's surface is due to convection, akin to boiling water in a pot (see Fig. 2); the bright and dark areas due to rising hot and sinking cool plasma, respectively. The temperature difference between the "rising" and "falling" bubbles of gas is about 230℃, over an average surface temperature of 5,500℃, which is enough to account for this change in brightness. Sometimes large networks of cells, some 30,000 km across, known as *supergranules*, can also form. Supergranules are often accompanied by *spicules*, huge spikes of matter shooting out from their edges at about 100 km/s, extending over thousands of kilometers (see Fig. 3).

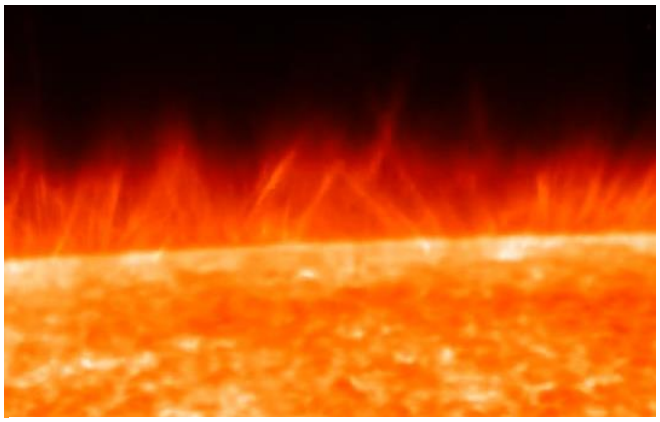


Figure 3. *Spicules extending above the limb of the Sun, as viewed by the Hinode spacecraft. (NASA/JAXA/Hinode)*

The source of the sun's magnetic field is thought to be created by a dynamo effect,

due to the differential rotation of the charged particles within the plasma between the radiation and convection zones, in a region called the tachocline. (In addition, the sun rotates faster at its equator than its poles, varying roughly between 25 to 31 days.) This process seeds the generation of rope-like tubes of concentrated magnetic field lines, within the convection zone, that restrict plasma flow and become buoyant, sometimes protruding the surface of the sun (especially near the equator, due to a higher centrifugal force), creating cool areas known as sunspots. As such, sunspots typically come in clusters of two, as these “magnetic flux tubes" exit and reenter the sun’s surface. These complex structures can sometimes produce arcs of hot ionized gas, called prominences, when seen on the sun’s limb, and filaments, when seen on the sun’s surface. Flux ropes can also sometimes be seen on the sun’s limb, which are tight loops of hot ionized gas, resembling needle-eyeholes. More energetic events can eject material in what is known as a coronal mass ejection (CME). A CME directed towards the Earth can trigger geomagnetic storms that produce aurora.

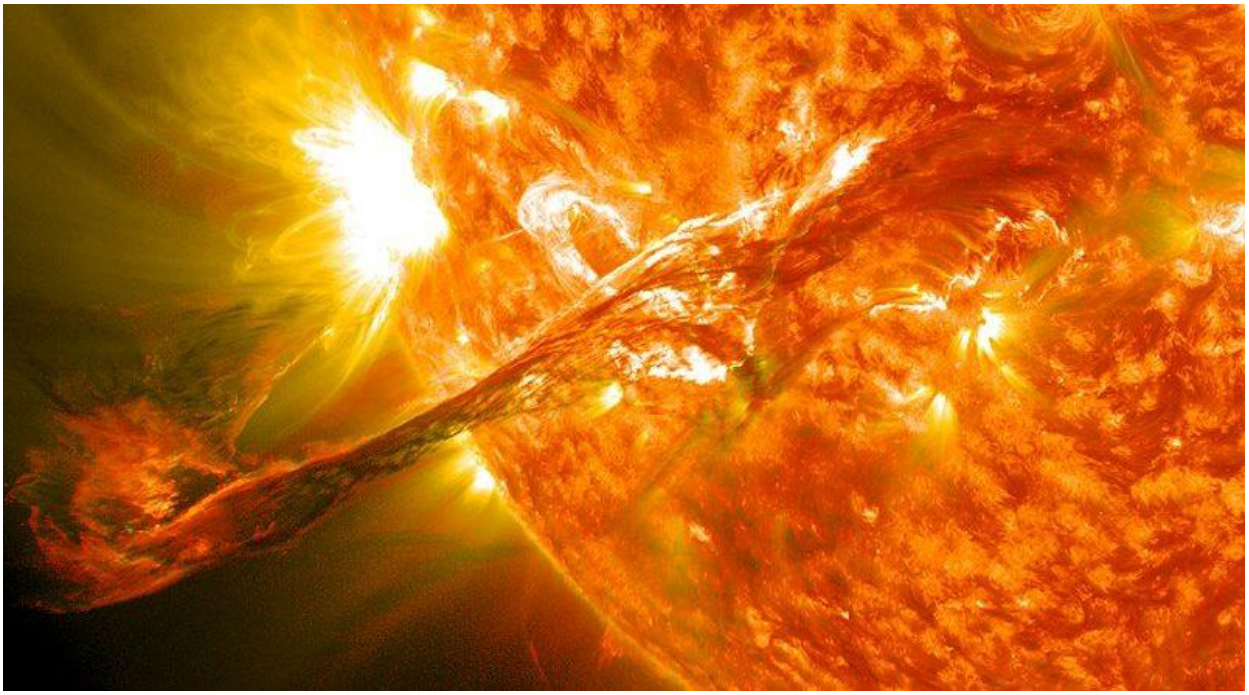


Figure 4. Composite image of a CME in progress, as observed by the Solar Dynamics Observatory in August of 2012. (*NASA/SDO/GSFC)*

The sunspot cycle is roughly every 22 years, wherein every 11 years (½ cycle) the sun’s magnetic poles flip. Essentially, it is due to a complex interplay between magnetic flux tubes, within the convection zone, knotting and unknotting themselves, i.e. alternating between maximum and minimum solar activity, respectively, every ¼ cycle.

The are many other solar phenomena, such as coronal holes, coronal rain, faculae, filament eruptions (i.e. CMEs), nanojets and nanoflares, plages, plumes and plumetes, solar flares, sunquakes, etc., that we encourage you to research further. Herein, we have introduced some basic concepts which should help in that endeavor. In our next article we shall discuss amateur solar observing equipment.

- *Dr. Michelle Boyce has a Ph.D in Physics and a Masters in Aerospace Engineering, and teaches Physics and Astronomy at the University of Manitoba. She is an active observer and imager of solar system objects and often presents the “What’s New” segment at monthly Centre meetings.*

Upcoming Meeting Agendas

January 13, 2023 – Annual General Meeting
7 p.m. Beginner's Session - gAIL Wise, "Constellation of the Month: Auriga the Charioteer"
7:30 p.m. Main Meeting

- Dennis Lyons, Welcome & Announcements
- Bryan Stach, "What's Up?"
- Dr. Michelle Boyce, University of Manitoba "What's New?"
- Jay Anderson – **"**Andromeda Galaxy: Checking out the Neighbourhood"
- **Annual General Meeting** of the Winnipeg Centre – agenda has been sent via email to all paid members

February 10, 2023
7 p.m. Beginner's Session - TBD
7:30 p.m. Main Meeting

- Dennis Lyons, Welcome & Announcements
- Bryan Stach, "What's Up?"
- Dr. Danielle Pahud, University of Manitoba "What's New?"
- **Main Speaker:** Darren Hennig, "Double Trouble: The Joys of Observing Double and Multiple Stars"

Telescopes For Kids 2022

by Scott Young, RASC Winnipeg Centre

For the third year in a row, the Winnipeg Centre has made the dreams of young astronomers come true by giving them their first telescope. Telescopes for Kids began in 2020 when some telescopes suitable for beginners were donated to the Centre. Instead of adding them to the Centre's rather large telescope lending library, it was decided to host a contest and award them to eager young astronomers.

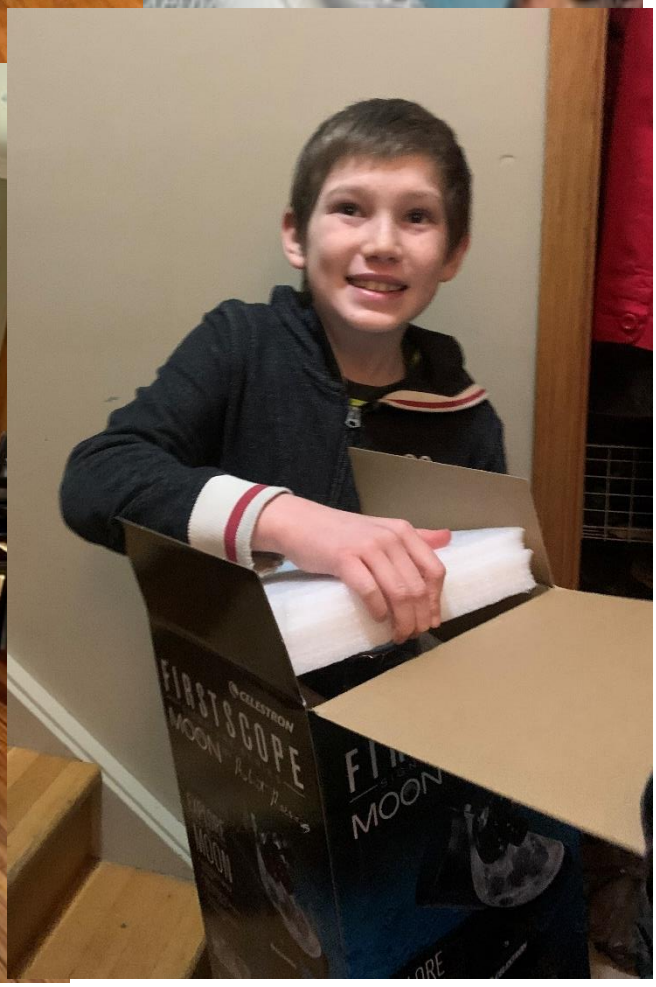
In 2021 the project expanded to include more telescopes, some donated by Centre members and others purchased through cash donations gathered through a GoFundMe account. Both events were spearheaded by Gord Tulloch, who laid a strong groundwork for the future of the Telescopes For Kids program.

For 2022, volunteer efforts at Council were largely focused on matters of incorporation and dealing with the flood at Glenlea among other things, so we got a bit of a late start. Still, in the last month of 2022 the Centre managed to raise more than $500 to purchase several telescopes to award: a Celestron NexStar refractor sourced by Stan Runge became the Grand Prize, and four Celestron FirstScope 3" Dobsonians became the runner-up prizes. The FirstScopes were purchased through David Astro in Quebec, whose owner David Brodeur gave the Centre a deal on the purchase, and also provided some free moon map posters for the winners. Thanks, David!

Entries came in various forms: letters, videos, PowerPoint presentations, and drawings. The winners were selected by a group of volunteers from Council, and the telescopes were delivered in early January. You can see the joy in the faces on the following page! (For privacy reasons, the winners are not identified in the photos.)

Telescopes for Kids is a great outreach initiative of our Centre, and one that has real impact for young people getting into astronomy. We hope to reach a larger audience next year and continue to provide "Telescopes for Kids" for many years to come.

Telescopes for Kids winners



Member's Photo Gallery

Centre member **Mike Karakas** captured this image of Mars on January 8th, 2023, using an 8" Maksutov-Cassegrain telescope and a ZWO ASI224C one-shot color camera. Syrtis Major is the triangular-shaped dark area near center.

Jupiter and two of its moons, captured with a monochrome ZWO ASI178 camera and RGB filters using an 80mm f/5 refractor and a 2x Barlow. The three black-and-white images were converted to a colour image using Nebulosity4 software. (Scott D. Young)

YOUR PICTURE HERE

Send your astronomical images or sketches to editor@winnipeg.rasc.ca and we'll publish them! Please include the equipment you used and any story about the experience you'd like to include.

Member's Photo Gallery (continued)

Astro-artist **Silvia Graca** made this incredible sketch of the Sun on the date of perihelion, the point when Earth is closest in its elliptical orbit. Silvia used a Coronado SolarMax II to view the sun's chromosphere in the light of hydrogen-alpha. (See Dr. Michelle Boyce's article on page 5 for detaisl on what this means!)

Member's Photo Gallery (continued)

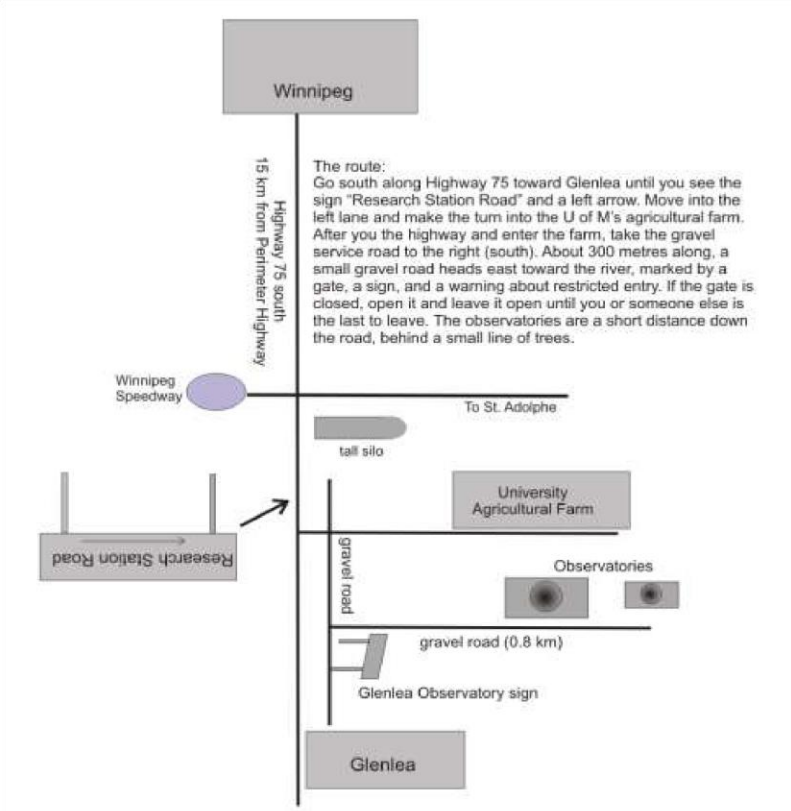
A Reminder of Summer

The Crescent Nebula in Cygnus is a compact emission nebula, which makes it well-suited for telescopic images compared to the other famous nebula in the region (the North America, Veil, and Pelican nebulae). Image by Mark Irvine, who used a C11 and ATik16200 monochrome camera with a narrow-band H-alpha filter.

Storm Giant

Jupiter shows incredible detail in its clouds at high resolution. In this image from October, the Great Red Spot is below center, surrounded by a spiral of darker cloud with a gap directly above the GRS – "the chimney is open". Note the dark spot to the GRS' lower left and multiple light and dark features in the north equatorial belt (above center). Image by Mark Irvine through a C11 with a ZWO ASI120 one-shot color camera.

Glenlea Observatory Information



The Winnipeg Centre maintains a working observatory, pad, and warm room at the University of Manitoba's Research Farm. The observatory contains a 30 cm Meade LX200 telescope on a fork mounting. Members of the Centre may sign up to use this telescope by emailing: observatory@winnipeg.rasc.ca provided they have first taken a short instruction course on its use.

The Meade provides outstanding views of the night sky. Its large aperture collects more than 1800 times as much light as the human eye. It is capable of magnifying more than 500 times under favourable conditions.

The warm room also provides a convenient place for members to take refuge from winter temperatures and summer mosquitoes, or to wait out a passing cloud. The building also provides desk space and lighting for planning a night's observing session. A concrete pad in front of the warm room and observatory provides a convenient space to place members' telescopes while conducting personal observing programs. A computer is available as well.

Etiquette requires that you approach the observing site with your headlights off if that's possible on your model of car. Headlights should remain off, but you can still use your parking lights to drive. Proceed slowly, and be careful about parked cars along the road, or people walking. If you cannot turn off your headlights, make a cardboard or garbage bag mask to dim the lights or, raise the parking brake lever one click-stop. This usually turns the headlights off on most, if not all, cars. You might wish to turn around at the end of the road so that you are facing the direction back toward the highway at the end of the evening.

Remember to turn off all lights, make sure doors are locked, and close the gate if you are the last one to leave!