

Saskatoon Skies

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

Volume 53, Number 11

December 2022



Royal Astronomical Society of Canada
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To view *Saskatoon Skies* digitally, see our website:
<https://saskatoon.rasc.ca/newsletters.html>

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MEMBERSHIP? JOIN TODAY!

Regular: \$111.00 /year

Youth: \$61.10 /year

Family: \$105.50 + \$42.90/additional adult + \$22.20/additional youth

The Saskatoon Centre operates on a one-year revolving membership. You will be a member for the next 12 months no matter when in the year you join. Members are encouraged to renew early to avoid disruption in publications. Renew through the National Office at <http://www.rasc.ca/join>.

Benefits of Membership in the Saskatoon Centre

- knowledgeable & friendly amateur astronomers
- use of the Sleaford Observatory
- use of the U of S Observatory (after training)
- Saskatoon Skies Newsletter
- Observer's Handbook
- Journal of the RASC (electronic format)
- borrow the Centre's projector to give astronomy outreach presentations – contact Les Dickson at astrochem@sasktel.net
- rent the Centre's Telescopes <https://saskatoon.rasc.ca/telescopes.html>
- use of the Centre library
- SkyNews Magazine (bimonthly)

SASKATOON CENTRE'S MAIN OFFICERS:

President – *vacant*

Vice-President – Brent Berlingham

Secretary – Rick Huziak

Treasurer – Donna-Lee May

National Council Rep – Les Dickson

Canadian Tire money - Darrell Chatfield

If you cannot attend a meeting but would like to donate your old Canadian Tire money please to assist with club purchases, email Darrell at novachat@sasktel.net.

NEWSLETTER INFO

Newsletter Editor – Colin Chatfield

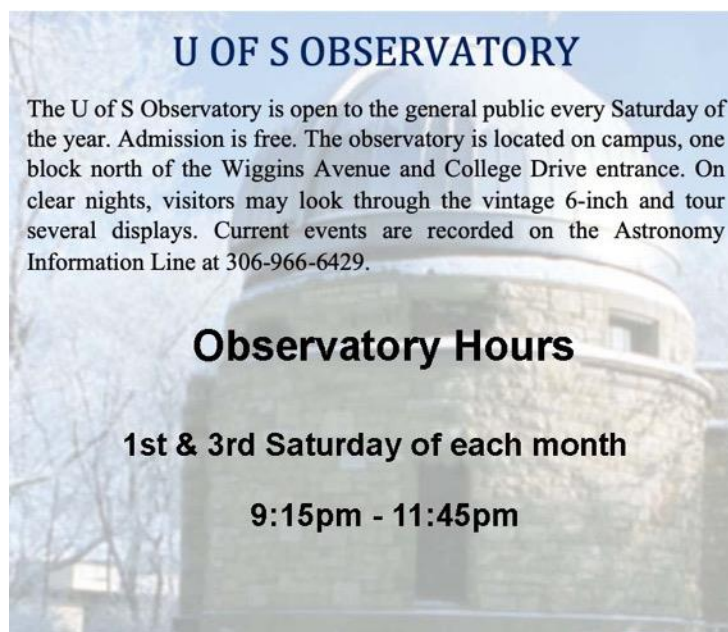
Copy & Collate – Les & Ellen Dickson

Labels & Temps – Mark de Jong

Web Posting/Content Editor – Gord Sarty/Tenho Tuomi

Saskatoon Skies is published monthly by the Saskatoon Centre of the RASC. Distribution is approximately 100 copies per issue. Saskatoon Skies welcomes unsolicited articles, sketches, photographs, cartoons, and other astronomy or space science material. Submissions should be sent by e-mail to the editor at colcha@gmail.com in MS Word or text format. Images (new or old): any format, less than 30MB, sent by e-mail as attached files. Send any articles of interest to the night sky or astronomy. **Deadline for submission of all articles for an upcoming issue is the first Friday of each month!**

Saskatoon Skies is also posted on our Saskatoon Centre homepage as a .pdf file and can be downloaded free-of-charge. Members may choose to receive the newsletter by regular mail or via the Internet. Articles may be reprinted from Saskatoon Skies without expressed permission (unless otherwise indicated), provided that proper source credit is given. Saskatoon Skies accepts commercial advertising. Please email the editor at colcha@gmail.com for rates. Members can advertise non-commercial items for free.



U OF S OBSERVATORY

The U of S Observatory is open to the general public every Saturday of the year. Admission is free. The observatory is located on campus, one block north of the Wiggins Avenue and College Drive entrance. On clear nights, visitors may look through the vintage 6-inch and tour several displays. Current events are recorded on the Astronomy Information Line at 306-966-6429.

Observatory Hours

1st & 3rd Saturday of each month

9:15pm - 11:45pm

Hours subject to change, so check below for more info -

Website - <https://artsandscience.usask.ca/physics/facilities/observatory.php>

Facebook - <https://www.facebook.com/usaskobservatory/>

RASC CALENDAR OF EVENTS & MEETING INFO

Dec 12	RASC Saskatoon Centre General Meeting	Brent Burlingham
Dec 17	Observer's Group - Sleaford Observatory	Brent Gratias

Observer's group viewing starts at dusk at the Sleaford Observatory dark site. Get there early and set up for a great night of observing! Members and their guests only.

For a complete list of club events, please visit: <https://saskatoon.rasc.ca/activities.html>

December RASC General Meeting

for all members and guests

Join us on December 12th, 2022 at 8:00PM (Executive meeting at 7:00pm)
Webinar (info below)

7:00pm - **RASC Executive Meeting** (Members may attend the executive meeting as observers if they wish)

A Zoom registration link and phone-in numbers will be emailed to Members.

After that, the procedure to register and join the meeting is the same as for the webinar (explained below).

NOTE: links to register to attend the webinar will be emailed out as well so we know who is planning to attend. After registering, an email invitation will be sent with a link to join via computer or a number to phone in. When joining via computer, participants will have to first download and install the Zoom app, if they have not done so already.

8:15pm - **Main Program -**

“What’s Up This Month?” – Colin Chatfield, Tara Magee

“SSSP 2022 (25th Anniversary)” - Les Dickson will go through how SSSP went, using photos from George Charpentier. Les will also show the Photo and Sketch competition entries and winners.

MINUTES OF NOVEMBER MEETINGS

Rick Huziak

Minutes of the Monthly Executive Meeting RASC Saskatoon Centre Monday, November 21, 2022 - 7:00 pm Online (ZOOM)

Attending: Brent Burlingham, Les Dickson, Rick Huziak, Ike Thiessen, Tenho Tuomi, Darrell Chatfield, Mark de Jong, Colin Chatfield. **Regrets:** Donna-Lee May

1. **Call to order** 7:05 pm – Brent Burlingham (VP)
2. **Approval of the October Executive meeting minutes** as circulated in the November newsletter. **Moved:** Mark de Jong. **Seconded:** Les Dickson. **CARRIED.**
3. **Approval of the October General (AGM) meeting minutes** as circulated in the November newsletter. **Moved:** Darrell Chatfield. **Seconded:** Jim Wood. **CARRIED.**
4. **Call for additional announcements/items** to add to agenda – Brent Burlingham. – Nothing added.

Old business:

5. **Loaner Scope Report** –
 - Motion to purchase (a second) Telrad for a loaner scope, not to exceed \$100.00. **Moved:** Ike Thiessen. **Seconded:** Darrell Chatfield. **CARRIED.**
6. **Treasurer's Report** received from Donna-Lee May as follows:
 - We received \$6,032.76 from SGI on the insurance claim.
 - On Nov. 18th, 2022, I reimbursed Darrell Chatfield \$3,335.34., (Cheque #001032). The payment consists of both insurance cost reimbursements paid by Darrell and Sleaford maintenance costs.
 - We have \$2,697.42 for the purchase of a new snowblower. Addition funds, over and above the amount required to purchase the replacement snow blower will require Executive approval.
 - This information will be expanded on at the next meeting.
7. An **Inventory of Centre Assets** is being made for insurance purposes. **Insurance Premium** can be adjusted after the asset audit. Terms for Acceptance of new equipment needs discussion. – Rick Huziak.

New Business:

8. Suggest the **Sleaford Joint Management Committee** schedule an annual meeting. Les Dickson has requested to be replaced on the committee. – Rick Huziak. Darrell Chatfield will determine a meeting date with U of S input.

9. **National Outreach event** correspondence regarding event registration– Rick Huziak – National is requesting we register event. Rick will clarify requirements with National.
 10. **Meteor camera trial at Sleaford** this December on behalf of Daryl Jansen & Glenn Hussey – Rick Huziak reports. The RASC does not have an issue with the trial.
 11. How to handle **two recent requests for information.** – Rick Huziak. Rick suggests we have a mentorship program that could match people & their requests with others of similar interests. Brent Burlingham suggests a membership survey about what they want from the club and that might roll mentorship into the survey.
 12. Discussion on **election outstanding positions** – Brent would like clarification if the VP can be Acting President. Les suggests the Nominating Committee remain and add Brent Burlingham as a member.
 13. Mark DeJong currently has **access to the Driven National database** provided when Mike Dolan was president, but now absence of a president may cause National access issues. Les Dickson will inquire about National authority.
- Motion to allow Les Dickson** (National Rep) to report the Executive member list to National RASC to aid in sorting out to access to Drive database reports. **Moved:** Les Dickson. **Seconded:** Jim Wood. **CARRIED.**
14. **Call to adjourn** – **Moved:** Les Dickson. 8:05 PM. **CARRIED.**

**Minutes of the Monthly General Meeting RASC Saskatoon Centre
Monday, November 21, 2022 - 8:00 pm Online (ZOOM)**

13 members on-line at beginning of meeting.

1. **Sharing / Networking Time** 8:00 PM – all members
2. **Call to order** – 8:15 PM – Brent Burlingham (VP)
3. **Call for additional items or changes to the agenda** – Brent Burlingham – announcement Item 4 added.
4. **Gord Sarty has been awarded asteroid (10499) Sarty.** The citation is as follow:

(10499) Sarty = 1986 RN5

Discovery: 1986-09-07 / H. Debehogne / La Silla / 809

Gordon Eric Sarty (b. 1960) is an astronomer who has lectured in physics, mathematics, and statistics at the University of Saskatchewan. He developed Magnetic Resonance Imaging for use by astronauts in space, studied high-mass x-ray binaries with the Microvariability and Oscillations of Stars (MOST) space telescope, and contributed to RASC's Saskatoon Centre.

As published here, on page 8 -

www.wgsbn-iau.org/files/Bulletins/V002/WGSBNBull_V002_015.pdf

5. **Call out to new members/guests:** Welcome James Chapman (guest speaker), and later, Obii Udemgba (during the meeting)
6. **Adoption of the October General Meeting minutes** as circulated in the November newsletter. **Moved:** Les Dickson. **Seconded:** Darrell Chatfield. **CARRIED.**
7. **Executive Meeting summary** – Brent Burlingham
 - See Executive Meeting.
8. **Outreach Activities** – Rick Huziak
 - 28 extra *2022 Night Sky Almanacs* have been sent to instructor Amber Daigneault for the *La Ronge and Area Family Literacy Hub*, one of 9 provincially funded literacy hubs in the province.
9. **SSSP 2023 Committee Report** – Les Dickson – First meeting for 2023 was held on Nov. 17. Les will chair for the year. Most members are returning except for Darrell Chatfield. (Thank you for the many years of service!) The committee is looking for new members and a new Door-prize Coordinator. SSSP financial meeting is scheduled for Dec. 15. The star party runs Aug. 15 – 20, 2023. Next org meeting Jan. 12.

10. Election of Officers

Introduction of rules – Rick Huziak:

- See October Agenda for Election Rules

The following positions remain unfilled: :

President – (2-year term) – vacant

Activities Coordinator – vacant

Webmaster – current Andrew Kostiuk. **Nominated:** Andrew Kostiuk (nomination accepted)

Speaker Coordinator – vacant

Motion to open Nominations from the floor. Rick Huziak. **Seconded:** Grant Ursaki.
Motion that Nominations Cease – Motion: Rick Huziak. **Seconded:** Ellen Dickson.
CARRIED.

Move to accept the slate of people who have accepted positions (i.e., Andrew Kostiuk) –
Les Dickson. **Seconded:** Grant Ursaki. **CARRIED.**

New Business: None.

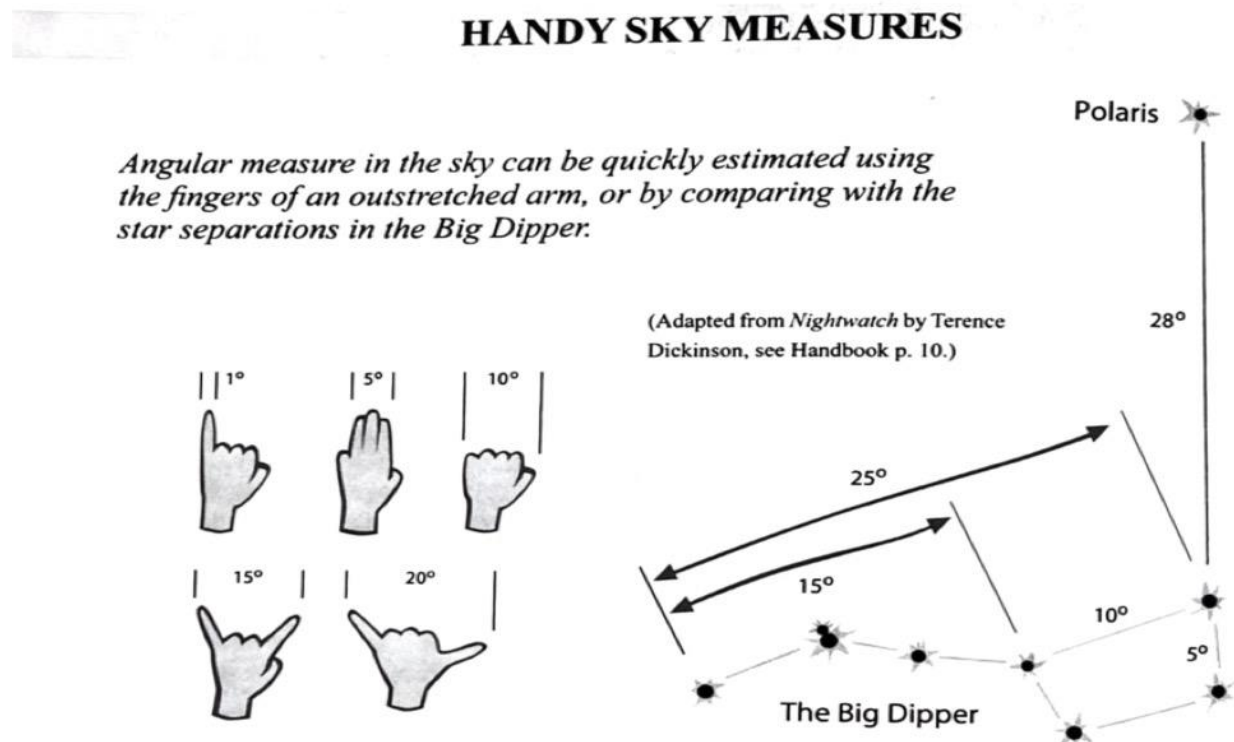
11. Programs:

- *What's in the Sky This Month* – Colin Chatfield
- *3D Printing a Small Telescope* – James Chapman

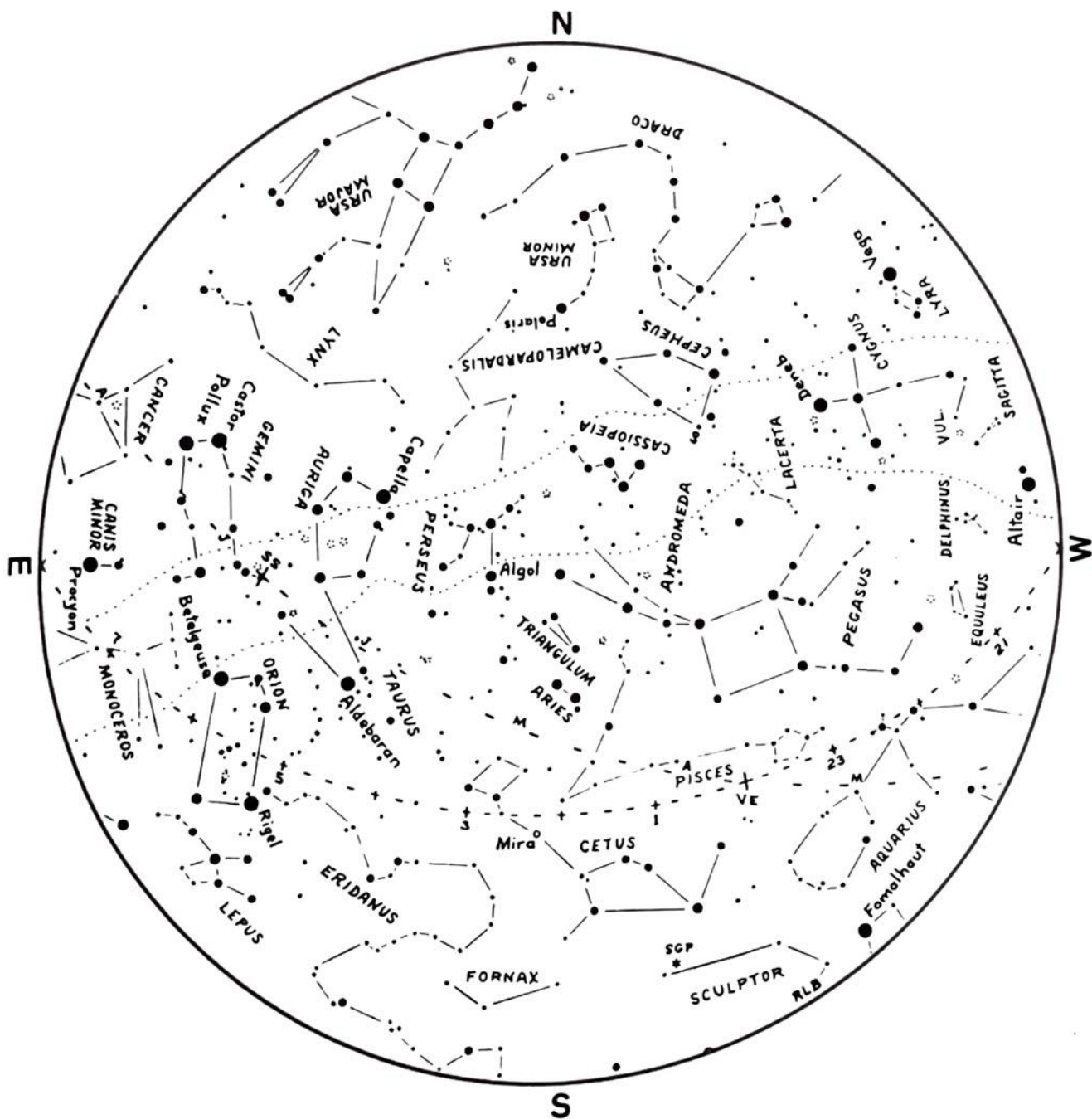
12. Call to adjourn – 9:40 PM. Moved: Ellen Dickson. **CARRIED.**

DECEMBER NIGHT SKY EVENTS AND INFO

Images on the next few pages taken with permission from the 2023 Observer's Handbook.
It can be obtained by joining the RASC here <http://rasc.ca/join> or ordered from
<https://secure.rasc.ca/Portal/Shop/RASC/Store/StoreMain.aspx?Category=CURRPUB>



Time (UT)			DECEMBER EVENTS		Jupiter's Satellites	
d	h	m			West	East
Thu.	1	0	Juno 1.2° S of Moon, occultation†		1.0	Ganymede
		2	Mars at closest approach		2.0	Io
		13	Neptune 3° N of Moon		3.0	
		15 22	Algol at minimum		4.0	
Fri.	2	1	Jupiter 3° N of Moon		5.0	Europa
Sat.	3				6.0	
Sun.	4	10	Neptune stationary		7.0	
		12 11	Algol at minimum		8.0	
Mon.	5	18	Uranus 0.7° S of Moon, occultation‡		9.0	Callisto
Tue.	6				10.0	
Wed.	7	9 00	Algol at minimum		11.0	
Thu.	8	4	Mars 0.5° S of Moon, occultation††		12.0	
		4 08	full Moon		13.0	
		6	Mars at opposition		14.0	
Fri.	9				15.0	
Sat.	10		Mercury at greatest heliocentric lat. S		16.0	
		5 49	Algol at minimum		17.0	
Sun.	11	8	Pollux 1.8° N of Moon		18.0	
Mon.	12		Jupiter at greatest heliocentric lat. S		19.0	
		0	Moon at apogee (405 888 km)		20.0	
Tue.	13	2 38	Algol at minimum		21.0	
Wed.	14	13	Geminid meteors peak		22.0	
Thu.	15	23 27	Algol at minimum		23.0	
Fri.	16	8 56	last quarter		24.0	
Sat.	17				25.0	
Sun.	18	20 16	Algol at minimum		26.0	
Mon.	19				27.0	
Tue.	20				28.0	
Wed.	21	15	Mercury greatest elongation E (20°)		29.0	
		17 05	Algol at minimum		30.0	
		21 48	Solstice		31.0	
Thu.	22	22	Ursid meteors peak			
Fri.	23	10 17	new Moon (lunation 1237)			
Sat.	24	8	Moon at perigee (358270 km) Large tides			
		11	Venus 3° N of Moon			
		13 54	Algol at minimum			
		18	Mercury 4° N of Moon			
Sun.	25					
Mon.	26		Venus at aphelion			
		16	Saturn 4° N of Moon			
Tue.	27	10 43	Algol at minimum			
Wed.	28	20	Neptune 3° N of Moon			
Thu.	29		Mercury at ascending node			
		3	Mercury stationary			
		9	Mercury 1.4° N of Venus			
		11	Jupiter 2° N of Moon			
Fri.	30	1 20	first quarter			
		7 32	Algol at minimum			
		10 27	Double shadow transit on Jupiter			
Sat.	31					



ITEM WANTED

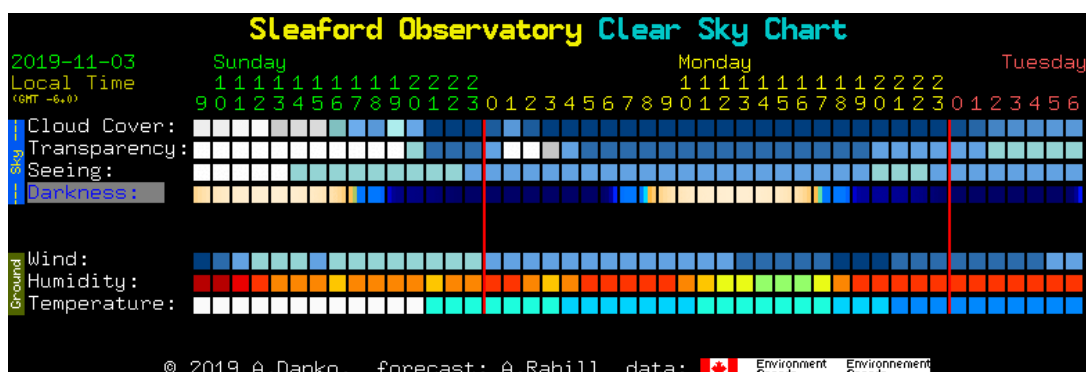
Looking for a used binocular parallelogram mount. If anyone has one gathering dust, and they want to get rid of it, please text Ron at 306-381-6256.

CLEAR SKY AND WEATHER INFO

To find clear skies, visit the Clear Dark Sky website -

<https://www.cleardarksky.com/csk/>

Once there, one can enter your location to find clear skies. The chart will appear as follows:



Environment Canada provides weather information for astronomy -

www.weather.gc.ca/astro



Saskatchewan Light Pollution Abatement Committee -

<http://myotherlife.net/slpac/>



www.darksky.org

SLEAFORD JSMC

Darryl Janzen

Minutes of the Sleaford Joint Site Management Committee Held at Sleaford Observatory, Nov, 27, 2022

Present: Darrell Chatfield (RASC), Daryl Jansen (U of Sask)

- RASC is currently down to one JSMC member, Darrell Chatfield. Les Dickson has stepped down from his position. Thanks for your many years of service on the committee, Les! For the time being, it was decided that meetings will take place between Darrell Chatfield and Daryl Janzen, with DC reporting to the RASC Exec and DJ reporting to the USask Physics & Engineering Physics Department Head (CC'ed).

- Discussed installation of meteor cameras at Sleaford by EP 495 group (supervised by Glenn Hussey). Two cameras are to be installed, with as long a baseline as possible, and connected to the computer via USB-over-ethernet extenders. The locations decided were to attach one to the roof of the outhouse on the southwest corner and mount one at the northeast corner of the "third acre". Ethernet lines will run from the USask roll-off, with one heading south-southeast, wrapping around the outside of the internet dish, the other heading east from the southeast corner of the roll-off, through the caragana's and then veering northeast towards the camera location. For the winter, the lines will be laid on the ground as these paths will not interfere with snow removal. They will be flagged as an extra measure of security. Then, in the spring/summer they are to be trenched and run inside a sprinkler line underground (at least within the mowed area).

- Discussed the possibility of erecting a second roll-off enclosure to the south of the current USask roll-off, to host SSA telescopes for ArianeGroup. This is a proposed partnership that initially came to the SSSP email several years ago and is still fairly uncertain, but they did recently reach out again to USask to pursue the possibility. We discussed that the hill at the north end was originally reserved for a second USask building, so there is a legacy agreement for a building to be constructed there, but this is a favourite observing location for RASC members and would be better left for that.

- Regarding the previous point, we discussed removal of trees from the perimeter of the site. Several have gotten quite high. If the ArianeGroup arrangement happens, they will need to view down to 10 degrees, so trees would have to go. The trees have also always made it difficult to view southern objects from the site, such as those in Sagittarius. These are two reasons in favour of removing trees, but there may be a wish to keep them. They do afford protection from wind and snow, although the caragana's may be enough. DC to discuss with RASC membership and open the floor for objections. In the meantime, DJ

will test out removing the two largest trees directly south of the roll-off in spring/summer 2023.

- Discussed that the RASC have not yet purchased a snow blower for the site, but plan to purchase one that is the same size as the one that was stolen. Currently, RASC plans to hire the RM to plow snow possibly a few times per year. DC asked if USask would split this cost and DJ accepted to do this.

- Finally, we discussed security cameras. The USask bullet cameras do not see the RASC shed, and the video quality is too poor in the dark.

- Cameras cannot shine IR light near the telescopes as it interferes with imaging. DJ will test the camera that points away from the telescopes, towards the entrance. Will turn on the IR light and see if it affects data quality. If not, then a camera pointed away from the roll-off would be able to use IR for night vision.

- Skynet recently installed new dome cameras at CTIO which appear to be good quality. Good night vision without IR as long as there is some moonlight. These are also run through a cloud-based app, which is better for security since they don't rely on a physical DVR device on site that could be stolen in the event of a theft. One benefit, then, is that the camera pointing away from the roll-off could be lowered so it is below the wall, reducing stray IR light, if needed. Dome cameras have 120-degree viewing angles, so two cameras would cover the full north-half of the site, from the roll-off to the shed.

- DJ will look into purchasing the same dome cameras and cloud-based control app that are installed with the PROMPT telescopes at CTIO. My recollection is that these were ~\$200 each, and the cloud-based service is ~\$50/year, so it would be a very affordable solution for the increased security.

That's everything I remember discussing. Please let me know if I missed anything, or feel free to forward on to the RASC Exec if you approve of the summary.

Daryl Janzen, Ph.D.
Dept. of Physics & Engineering Physics
University of Saskatchewan

BOOKS FOR SALE

All books are in either new, or like new condition. Retail price in brackets. Please email at novachat@sasktel.net or text/call 306-222-0515 if you want a particular book to make arrangements. All books being sold by Darrell Chatfield.

“Deep-Sky Observers Handbook”	Volume 1-5	Enslow-Lutterworth	\$40.00
“International Encyclopedia of Astronomy”	1987	Patrick Moore	Color \$10.00
“Backyard Astronomers Guide”	T. Dickinson & Alan Dyer	2008	Color \$25.00
“Atlas of Deep Sky Splendors”	1978	H. Verhenberg	(50.00) B & W \$22.00
“Amateur Astronomers Catalog of 500 Deep Sky Objects”	Vol 1	1980	B & W R. Morales \$15.00
“Observing the Constellations”	1989	J. Sanford	Color charts \$10.00

2023 RASC CALENDARS



2023 calendars have arrived. If you want a 2023 RASC Calendar, we have a limited supply available for \$20 each. **Call Donna-Lee at 780-913-2785.** They can be picked up at her house in Saskatoon, or if you live away from Saskatoon, we can arrange to mail them out to you at a small additional cost.

SERVICE MEDALS

Rick Huziak



The beautifully cast and engraved bronze Service medals have finally arrived. We managed to get Tenho's medal to him when he was in Saskatoon in mid-November. We are very proud of Tenho's achievements and contributions as part of the Saskatoon Centre and at the National RASC level. You can read Tenho's citation in *Saskatoon Skies*, May 2023, page 17. You can also read Tenho's *Digital Astrophotography: A Primer* article on pages 91 – 93 of the *RASC Observer's Handbook 2023*. Merlyn's medal remains to be presented in person.



Pleiades by Justin Lukan

NATIONAL COUNCIL REPORT - DECEMBER 2022

Les Dickson - Saskatoon Centre National Council Rep

This is a summary of significant items arising in the RASC National Council meeting of December 4, 2022

National's financial position as of October 31, 2022

The Treasurer of the RASC Catherine Carr gave a detailed report on National's financial situation for the period Jan–Oct 2022 (fiscal year runs from Jan–Dec). The society has experienced a loss in this period of c. \$784K, due mainly from decreases in revenues in the form of grants and donations, and from investment losses. They are expecting a large donation in the form of a bequest in the order of a few \$100k to offset some of the decrease in donations. Expenses have also increased, mainly due to the high inflation rate. Revenue from membership fees, about \$234K, did not cover the expenses for membership services, about \$341K. SKYNEWS has suffered a loss for the current year. This is due in part to a decrease in advertising revenue, some of it due to the bankruptcy of Meade which used to buy full page ads, as well as increased production and shipping costs. Executive Director Phil Groff will schedule on-line town-hall meetings open to all members starting in January to discuss the financial situation.

DRIVEN database problems

National Council (NC) has identified the DRIVEN database as a major source of irritation between Centres and National. Our own Centre experienced problems with our calendar order, receiving two boxes of calendars when only one was ordered. Something as simple as changing the name of the person receiving emails and such directed at our President after Mike Dolan resigned took several weeks to sort out. As a result of the criticism from many Centres, Phil Groff has instituted a weekly update sent out to all NC members listing fixes and corrections made and a list of outstanding issues. NC members appreciate the attempts at transparency. The problems are slowly being fixed but there is still much to do.

Centre Annual Reports for 2022

The new editor for the Annual Report is Robin Foret. He requests that all Centre annual reports, including financial statements, be received by January 31, 2023. He will be sending out templates for the reports to the Centres.



*Big dipper standing on its tail, October 30, 12:35am
Canon T5i, 18mm lens, 15 seconds, ISO 3200 by Tenho Tuomi*

OBSERVING CERTIFICATES AND CLUBS

RASC OBSERVING PROGRAMS AND CERTIFICATES

The RASC offers four observing certificates for **members** who observe all objects in each of the following observing lists in this chapter:

- THE MESSIER CATALOGUE (p. 312)
- THE FINEST NGC OBJECTS (p. 316),
- THE DEEP-SKY CHALLENGE OBJECTS (p. 320),
- DEEP-SKY GEMS (p. 322).

See rasc.ca/certificate-programs for details and contact the RASC Observing Committee Chair at rasc.ca/contact/observing for further information.



The RASC also offers the **Explore the Universe Certificate** for novice observers (who do not have to be RASC members), the **Explore the Moon Certificate** for beginning members, and the **Isabel Williamson Lunar Observing Certificate** and the **Double Stars Observing Certificate** for intermediate to advanced members. In addition, **Astroimaging certificates** are available for those members with a photographic bent. See rasc.ca/astro-imaging-certificate

Join the Club! Observe all 110 Messier, 110 Finest NGC, 400 Herschel I or II, 140 Lunar, 154 Sky Gems or 35 Binocular objects, or Explore the Universe and earn great OBSERVING CERTIFICATES!

MESSIER CLUB

Certified at 110 Objects:

*R. Huziak, G. Sarty,
S. Alexander, S. Ferguson,
D. Chatfield, T. Tuomi, L.
Scott, G. Charpentier, B.
Johnson, L. Dickson,
B. Burlingham, Norma Jensen,
Donna-Lee May*

Ron Waldron	108
Brent Gratias	96
Marcel Müller-Goldkuhle	94
Wade Selvig	75
Wayne Schlapkohl	43
Ellen Dickson	34
Graham Hartridge	9

CHATFIELD BINOCULAR CERTIFICATE

Certified at 35 to 40 Objects:

T. Tuomi, R. Huziak

Jim Goodridge	12
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FINEST NGC CLUB

Certified at 110 Objects:

*R. Huziak, G. Sarty,
D. Chatfield, T. Tuomi*

Larry Scott	110
Scott Alexander	97
Norma Jensen	83
Sandy Ferguson	23
George Charpentier	13

EXPLORE THE UNIVERSE

Certified at 55 to 110

Objects: *T. Tuomi, B. Gratias*

Wayne Schlapkohl	55
Jim Goodridge	35

ISABEL WILLIAMSON LUNAR OBSERVING CERTIFICATE

Certified at 140 Objects:

T. Tuomi, N. Jensen

EXPLORE THE MOON CERTIFICATE

T. Yaworski

Brent Gratias	37
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HERSCHEL 400 CLUB

Certified at 400 Objects:

*R. Huziak, D. Chatfield,
T. Tuomi*

Gordon Sarty	251
Scott Alexander	117
Larry Scott	45
Sandy Ferguson	18

HERSCHEL 400-II CLUB

Darrell Chatfield	400
Tenho Tuomi	378
Rick Huziak	246

LEVY DEEP-SKY GEMS

Certified at 154 Objects:

Tenho Tuomi	150
Darrell Chatfield	70

Messier, Finest NGC, and David Levy's Deep-Sky lists in the *Observer's Handbook*. The Explore the Universe list is available here <http://www.rasc.ca/explore-universe>

Messier and Finest NGC lists, charts and logbooks: <http://www.rasc.ca/observing>
Herschel 400 List: <http://www.astroloague.org/al/obsclubs/herschel/hers400.html>

Binocular List is at: https://www.usask.ca/rasc/Chatfield_Binocular_List.pdf

“Isabel Williamson Lunar Observing Program Guide”:

<http://www.rasc.ca/sites/default/files/IWLOP2015.pdf>

Program details can be found at: <http://www.rasc.ca/williamson/index.shtm>