

Saskatoon Skies

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

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Royal Astronomical Society of Canada
Saskatoon Centre Incorporated
Box 31086, RPO Broadway
Saskatoon, SK S7H 5S8

WEBSITE: <http://www.usask.ca/rasc/>

E-MAIL: sk_centre@rasc.ca

FACEBOOK: [RASC Saskatoon Centre](#)

INSTAGRAM: [@RASCYXE](#)

To view *Saskatoon Skies* digitally, see our website:
<http://www.usask.ca/rasc/newsletters.html>

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MEMBERSHIP? JOIN TODAY!

Regular: \$96.00 /year

Youth: \$52.00 /year

Family: \$90.50 + \$41/additional adult + \$21.10/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)
- SkyNews Magazine (bimonthly)
- borrow the Centre's projector to give astronomy outreach presentations – contact Les Dickson at astrochem@sasktel.net
- rent the Centre's Telescopes <https://www.usask.ca/rasc/telescopes.html>
- use of the Centre library

SASKATOON CENTRE'S MAIN OFFICERS:

President – Daryl Janzen

Vice-President – Jim Goodridge

Secretary – Rina Rast

Treasurer – Norma Jensen

National Council Rep – Les Dickson

Canadian Tire money - Darrell Chatfield

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

NEWSLETTER INFO

Newsletter Editors – Colin Chatfield, Grant Ursaki

Copy & Collate – Les & Ellen Dickson

Labels & Temps – Mark de Jong

Web Posting – Gord Sarty

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@sasktel.net 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@sasktel.net for rates. Members can advertise non-commercial items for free.



© Rina Rast & Brennan Rodgers

M81/M82 taken by Rina Rast and Brennan Rodgers Feb.20, 2020 using the 11" Astrograph on the Physics building at the U of S and a ZWO ASI 294 MC Pro Camera

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:

January – February	7:00 – 9:30 pm
March	8:00 – 10:30 pm
April – August	9:15 – 11:45 pm
September	8:30 – 11:00 pm
October – December	7:00 – 9:30 pm

U of S Observatory website -

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



Saskatchewan Light Abatement Committee -

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



www.darksky.org

RASC CALENDAR OF EVENTS

March 14	Observer's Group (weather permitting)	Larry Scott
March 16	RASC General Meeting - 8:00pm (info below)	Daryl Janzen
March 16	Visual Observing for Beginners - U of S Observatory	Jim Goodridge
March 21	Observer's Group Messier Marathon (weather permitting)	Larry Scott

For a complete list of club events, please visit: <http://www.usask.ca/rasc/activities.html>

March RASC General Meeting for all members and guests

Join us on March 16, 2020 at 8:00PM

Room 175, Physics Building
University of Saskatchewan

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

8:00pm - **Meet & Greet Social**

8:15pm - **Warm-up Program**

8:30pm - **Main Program**

Speakers include:

- **Jim Goodridge** - "What's Up in the Sky This Month"

- **Les Dickson, SSSP '20 Chair** - "SSSP 2020" Les will provide a slideshow from the 2019 Saskatchewan Summer Star Party and update us with the plan for SSSP 2020!

- **Phil Groff, Executive Director RASC** - "*Greetings from the RASC National Office!*" Phil comes to us from National Office in Toronto.

In Phil's words, "I've made a commitment to visit each Centre during my first year as Executive Director. The goal is to give a short talk to introduce myself, give a few updates from the National Office, and mainly just to reopen dialogue between the Centres and RASC National."



9:45pm - **Visual Observing for Beginners** at the U of S Observatory. Jim Goodridge will be leading beginning observing sessions at the observatory for new members and beginning observers. Easy projects for eyes, binoculars & telescopes. No charge.

9:45pm - After Meeting Meeting Social at Alexander's restaurant (Cumberland Ave) for those interested

SPEAKERS FOR MEETINGS

Rick Huziak

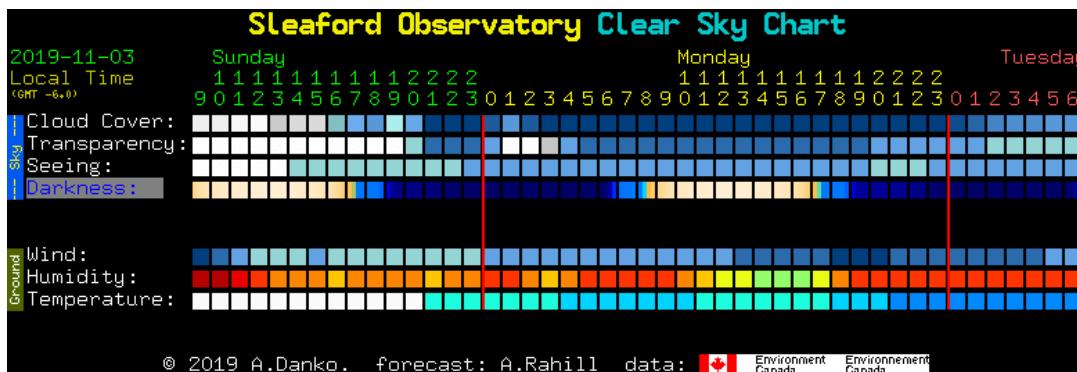
Getting speakers for each general meeting is harder than pulling teeth - plain and simple. Going forward, we have only three speakers lined up until the end of the season. In March, Les Dickson will use a SSSP 2019 slide show to announce SSSP 2020. Daryl Janzen will talk about U of S telescopes, and then later in the spring, Gord Sarty will talk about his Space MRI. But with three other main talks and three minor talks to fill the agenda with, it is highly likely that you will be listening to talks about my favourite variable stars or the latest light pollution crisis ... again. So, please volunteer to give a talk about your favourite astronomy topic or experience. It doesn't have to be long and everyone has some sort of interest in the sky. As a matter of fact, there is an entire universe out there to talk about! So, be it 5 minutes or 55 minutes. I'd love to hear from you.

CLEAR SKY AND WEATHER INFO

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

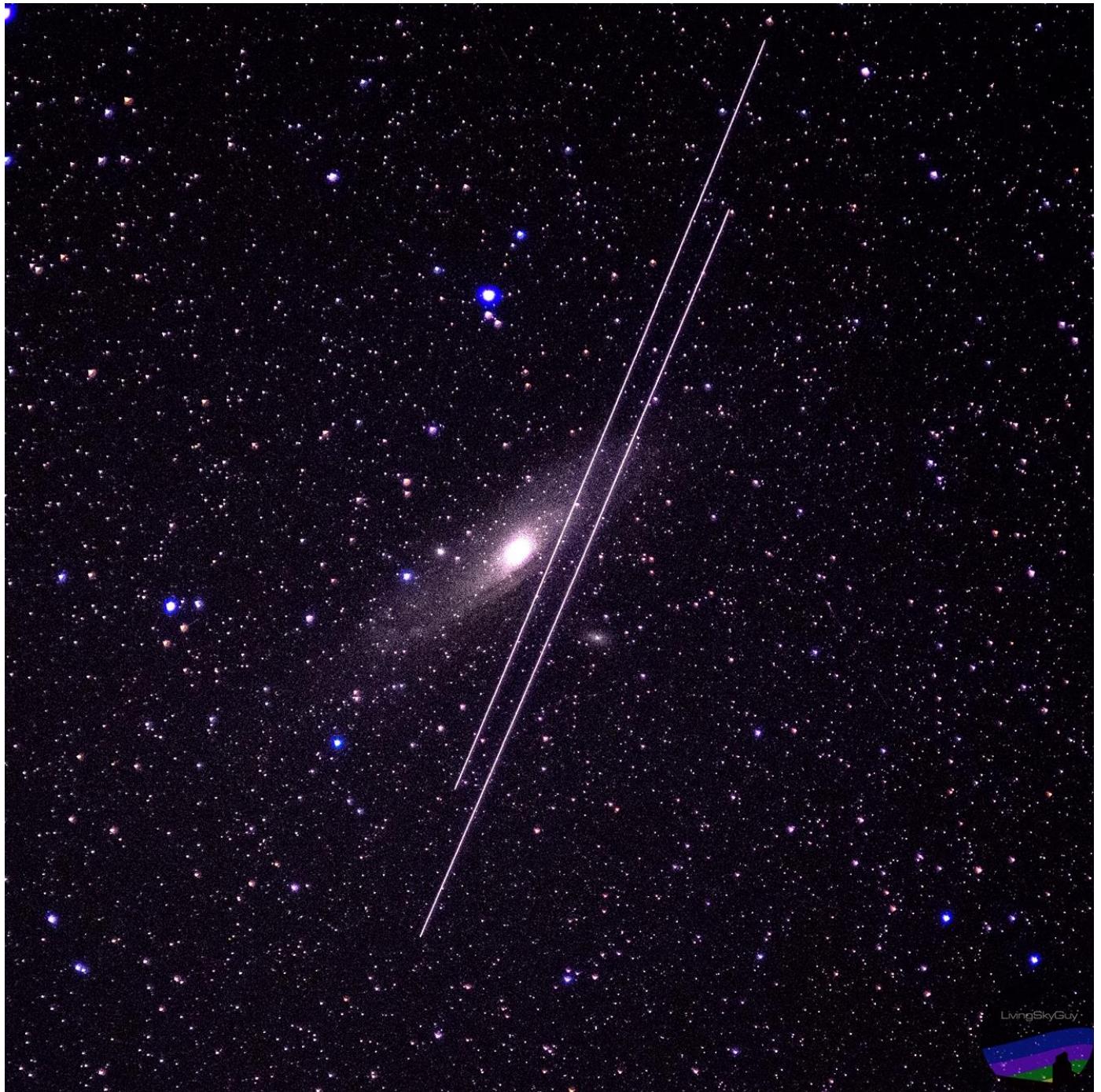
<https://www.cleardarksky.com/csk/>

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



*One of Tim Yaworski's subs while shooting Andromeda was "photobombed" by a pair of satellites.
Something to look forward to as more and more satellites are launched in the near future.*

TOUCH THE SKY: THE STORY OF AVRO CANADA

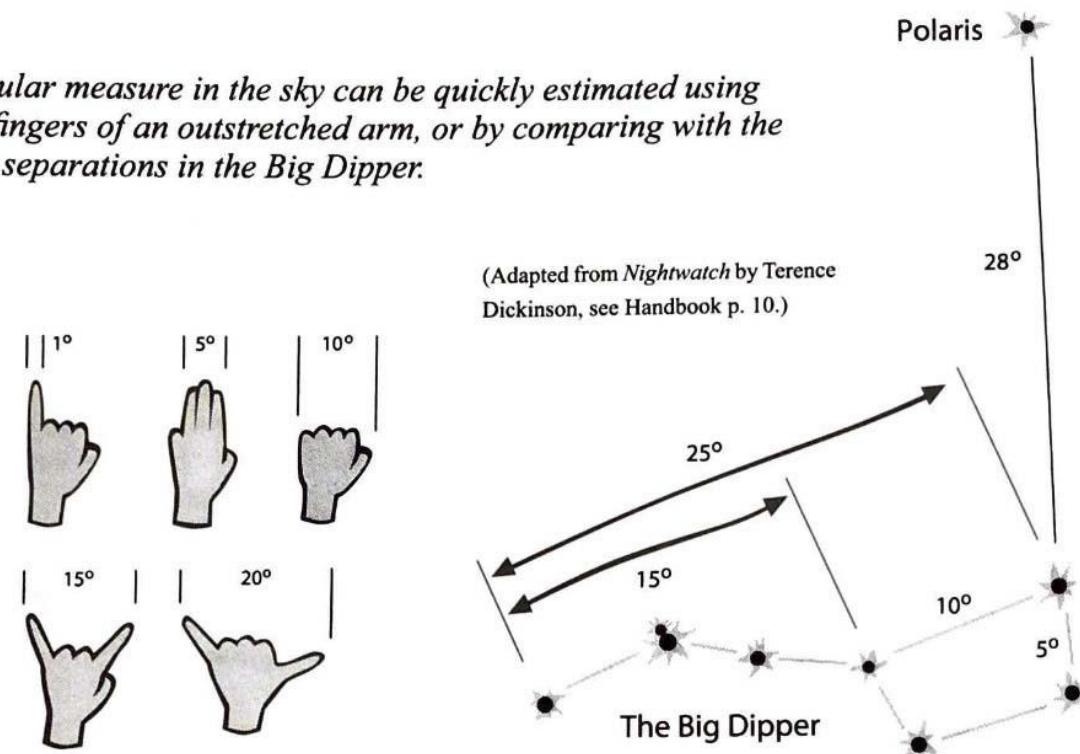
A pioneer in aircraft manufacturing, Avro Canada Ltd. was most recognized for its Avro Arrow aircraft—a model intended to serve the Royal Canadian Air Forces. Highly debated in government for its cost and national defence implications, Prime Minister Diefenbaker abruptly cancelled the production of the Avro Arrow in 1959. Curated by the Diefenbaker Canada Centre, this exhibit tells the story of Avro Canada's creation and its impact in the world of aeronautics and technology.

<https://diefenbaker.usask.ca/exhibits/Current-exhibits.php#TouchtheSkyTheStoryofAvroCanada>

MARCH NIGHT SKY EVENTS AND INFO

Images on the next few pages taken with permission from the 2020 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/StoreMain.aspx?Category=CURRPUB>

HANDY SKY MEASURES



RASC OBSERVER'S HANDBOOK 2020

THE SKY FOR MARCH

		Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Sun
RA	1	22h 13m	1h 32m	18h 39m	19h 23m	20h 00m	2h 05m	23h 17m	22h 48m
	11	21h 59m	2h 12m	19h 10m	19h 31m	20h 04m	2h 07m	23h 18m	23h 25m
	21	22h 21m	2h 53m	19h 39m	19h 38m	20h 07m	2h 09m	23h 20m	0h 02m
Dec	1	-7° 23'	+10° 46'	-23° 32'	-22° 04'	-20° 36'	+12° 13'	-5° 44'	-7° 36'
	11	-10° 58'	+15° 22'	-23° 03'	-21° 49'	-20° 26'	+12° 22'	-5° 36'	-3° 43'
	21	-11° 07'	+19° 24'	-22° 14'	-21° 35'	-20° 16'	+12° 32'	-5° 27'	+0° 13'
Dist	1	0.63	0.89	1.71	5.77	10.73	20.39	30.91	0.991
	11	0.72	0.81	1.63	5.63	10.61	20.52	30.92	0.993
	21	0.86	0.74	1.55	5.49	10.47	20.63	30.91	0.996
Mag	1	3.7	-4.3	1.1	-2.0	0.7	5.8	8.0	
	11	0.9	-4.4	1.0	-2.0	0.7	5.9	8.0	
	21	0.2	-4.4	0.9	-2.1	0.7	5.9	8.0	
Size	1	10.6"	18.8"	5.5"	34.2"	15.5"	3.4"	2.2"	32' 17"
	11	9.4"	20.5"	5.7"	35.0"	15.7"	3.4"	2.2"	32' 12"
	21	7.8"	22.6"	6.0"	35.9"	15.9"	3.4"	2.2"	32' 07"

Moon: On March 0 at 0h UT*, Sun's selenographic longitude is 333.01° and increases 12.2° each day thereafter.

Greatest N declination on the 5th (+23.4°)

Greatest S declination on the 18th (-23.4)

Libration in longitude: E limb most exposed on the 16th (+7.5°)

W limb most exposed on the 5th (-7.8°)

Libration in latitude: N limb most exposed on the 24th (+6.5°)

S limb most exposed on the 11th (-6.5°)

Large tides in the days following full Moon (Mar. 9)

Mercury: Emerges in the morning sky, becoming increasingly visible throughout the month as it gradually gains separation from the Sun, brightening all the while. It achieves greatest elongation west (GEW) on the 24th near the maximum possible value of 28°, though at relatively modest mag. +0.2. The geometry of the ecliptic favours Southern Hemisphere observers for this apparition.

Venus: Towers majestically in the western sky during evening twilight and remains well placed later in the evening against a truly dark sky. Passes 2° north of Uranus on the 8–9. Reaches greatest eastern elongation (GEE) of 46° on the 24th, when its declination is fully 19° N of the Sun. The waxing crescent Moon passes 7° to its S on the 27–28.

Mars: Spends the month overtaking its fellow outer planets Jupiter and Saturn, passing within 1° of Jupiter on the 20th and of Saturn on the 31st. The latter conjunction will feature two planets of near-identical brightness, a rare sight. This cluster of outer planets will be very well seen in the Southern Hemisphere, but the shallow angle of the morning ecliptic will challenge Northern Hemisphere observers. The waning crescent Moon joins the scene on the 18th, when all four bodies will be within 10°.

Jupiter: Remains part of a pleasing cluster of outer planets visible in morning twilight. The waning crescent Moon passes 1.5° to its south on the 18th. In conjunction with Mars on the 20th, when both planets lie some 22° south of the celestial equator while the Sun is itself at the equinox. Thus the angle of the ecliptic is poor for Northern Hemisphere observers, favourable for those in the Southern Hemisphere.

Saturn: Moves from Sagittarius into Capricornus in the middle of the month as Jupiter and Mars gradually close in from the west. The waning crescent Moon joins the scene to make a can't-miss quartet on the morning of the 18th for Western Hemisphere observers. All will be low to the horizon for Northern Hemisphere observers, especially those in higher latitudes, and invisible beyond the Arctic Circle. Those in the Southern Hemisphere have much more favourable geometry for viewing the giant planets all year long. Mars passes within 1° of Saturn on the morning of the 31st.

Uranus: Visible with increasing difficulty early in the evening, even as the high angle of the ecliptic remains favourable to Northern Hemisphere observers.

Neptune: Too close to the Sun to be seen throughout March. In solar conjunction on the 8th.

*See p. 94, the bold-faced sentences of the first paragraph.

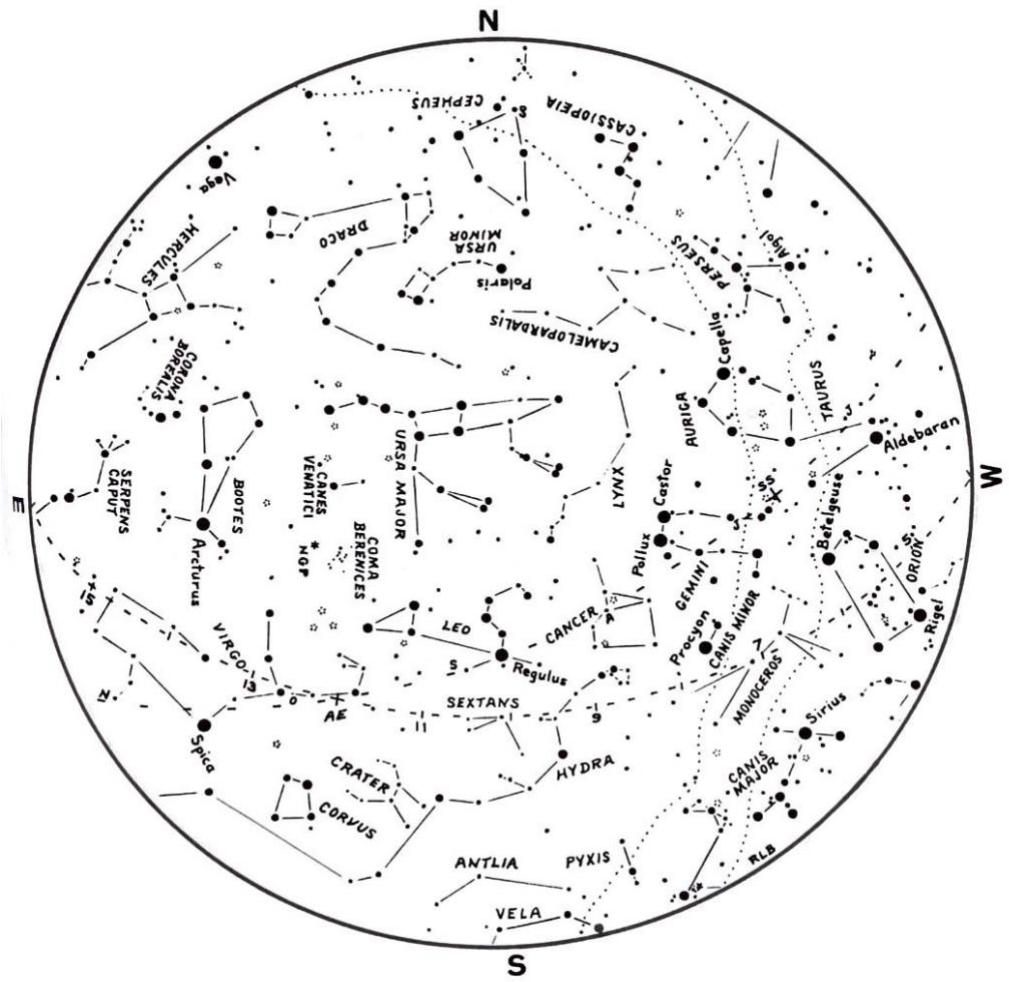
	Time (UT) d h m	MARCH EVENTS	Jupiter's Satellites West	East
Sun.	1 6	Vesta 0.1° N of Moon, occultation†		
Mon.	2 19 57	First quarter		1.0
Tue.	3 1 36	Algol at minimum		2.0
Wed.	4 9	Moon 1.2° S of M35		3.0
Thu.	5 22 25	Algol at minimum		4.0
Fri.	6 22	Moon 1.1° N of Beehive (M44)		5.0
Sat.	7			6.0
Sun.	8 12	DAYLIGHT SAVING TIME BEGINS		7.0
	19 14	Neptune in conjunction with the Sun		8.0
Mon.	9 8	Algol at minimum		9.0
	15	Mercury stationary		10.0
	17 48	Venus 2° N of Uranus		11.0
Tue.	10 6	Full Moon (largest in 2020)		12.0
Wed.	11 16 03	Moon at perigee (357122 km) Large tides Zodiacal Light vis. in N lat. in W after evening twilight for next two weeks Algol at minimum		13.0
Thu.	12			14.0
Fri.	13			15.0
Sat.	14 12 52	Algol at minimum		16.0
Sun.	15			17.0
Mon.	16 9 34	Mercury at descending node		18.0
Tue.	17 9 41	Last quarter		19.0
Wed.	18 17 43	Algol at minimum		20.0
	8	Double shadow transit on Jupiter		21.0
	10	Mars 0.7° N of Moon, occultation‡		22.0
	15	Jupiter 1.5° N of Moon		23.0
Thu.	19 0	Pluto 0.9° N of Moon, occultation††		24.0
Fri.	20 3 50	Saturn 2° N of Moon		25.0
	6	Venus at perihelion		26.0
	6 30	Equinox		27.0
Sat.	21 18	Mars 0.7° S of Jupiter		28.0
Sun.	22	Algol at minimum		29.0
Mon.	23 3 19	Mercury 4° N of Moon		30.0
Tue.	24 2	Algol at minimum		31.0
	9 28	Mercury greatest elongation W (28°)		
	15	New Moon (lunation 1203)		
	19 37	Moon at apogee (406692 km)		
Wed.	25 22	Double shadow transit on Jupiter		
Thu.	26 0 08	Venus greatest elongation E (46°)		
Fri.	27 21	Algol at minimum		
Sat.	28 11	Uranus 4° N of Moon		
Sun.	29 20 57	Mercury at aphelion		
Mon.	30 7	Venus 7° N of Moon		
Tue.	31 11	Algol at minimum		
	16	Vesta 0.2° N of Moon, occultation††		
	17 46	Mars 0.9° S of Saturn		
	22 49	Moon 0.9° S of M35		
		Algol at minimum		
		Double shadow transit on Jupiter		

†W & N Australia, E Indonesia, NW Melanesia, Micronesia, Hawaii

‡S South America, South Georgia, Antarctica, Kerguelen Is.

††Most of Antarctica

††S Indian Ocean, Indonesia, parts of SE Asia, Philippines, Micronesia, N Polynesia (except Hawaii)



Moon and Venus taken by Mike Dolan using DigiCamControl and a Nikon D3400 with 55-200mm lens at 200mm, f/5.6, 3200 ISO, 1/4 second exposure

MINUTES OF FEBRUARY MEETING

Rina Rast

Minutes of the Executive Meeting, February 24, 2020

Attendees: Daryl Janzen, Les Dickson, Ellen Dickson, Tenho Tuomi, Jim Goodridge, Tim Yaworski, Mark DeJong, Rina Rast

Meeting called to order by Daryl Janzen at 7:04 PM.

Approval of executive minutes published in February 2020 issue. Motion to adopt minutes by Ellen Dickson, seconded by Jim Goodridge, passed as all were in favour.

Reports:

New business:

1. Looking for volunteers to run a short session on astrophysical news from the Regina center. Daryl suggested doing a running slideshow in the background during the first 15 minutes as people arrive.
2. Variable Star Observer's Group with Jim:
 - a. No meeting in March (after-meeting social with Phil Groff instead)
 - b. These groups are ending as of May 2020, due to lack of attendance.
 - c. April session: will be a hands-on session for collimating Dobsonians. Bring yours if you'd like to learn!
3. National Council Report from Les Dickson:
 - a. Generic manual for running an RASC center is being drafted, will be presented at the GA in Vancouver.
 - b. Discussion regarding new/updated publications, new policy manual, and upcoming editions of SkyNews.
 - c. New software being developed for the RASC information management system.
4. Discussion regarding the center covering costs that are not covered by National for a representative attending the GA.
 - a. National currently covers 75% of the cost, last year the Saskatoon center covered 25%, up to a cap of \$500. Motion to continue doing this, passed as all were in favour.
5. It was recently discovered that the email address astroimaging@rasc.ca has not been functional since August, so there is a backlog in approving astro-imaging certificates.

6. Discussion regarding StarLink: General idea is that individuals are free sign petitions, it can be mentioned in meetings or emails, however signing it officially as the RASC should not be done.
7. Canada Summer Jobs application:
 - a. Centers in the past have hired students through CSJ and there is a myriad of tasks at the Observatory (connected to the RASC) that can justify full-time positions over the summer.
 - b. The idea is to apply through the RASC for this, unfortunately we would need the Saskatoon center's business number by the application deadline (Feb 28th), and this will be a challenge.
 - c. Should this go through under the RASC, RASC would be responsible for worker's compensation, EI, CPP, and vacation pay. Possibility of applying through the university and then having the RASC gift an amount of money to fund the employment was discussed (will probably pursue this).
8. Robotic telescope updates:
 - a. Discussion regarding getting the 16" telescope at Sleaford functional as a robotic telescope sometime in the future, with some funding from National. This would be a way to engage National as well as serve local members. Discussion regarding feasibility (maintenance, size of telescope). The discussion tabled for now, as this is a long-term idea.

Call to adjourn at 8:01 by Les Dickson, passed as all were in favour.

Minutes of General Meeting, February 24, 2020

Meeting called to order by Daryl Janzen at 8:17 PM.

Motion to adopt minutes of general meeting published in February 2020 newsletter by Ellen Dickson, seconded by Mike Dolan, passed as all were in favour.

Business from executive meeting:

1. Petitions for StarLink:
 - a. Some are concerned about the satellite's effects on astrophotography or science imaging done by amateurs.
 - b. Petitions should be signed as individuals, not officially under the RASC.
 - c. Contact Rick Huziak if you would like to sign a petition.
2. Robotic telescope:
 - a. Demonstration by Daryl Janzen with telescope and mount in the room, the camera is functional. Mount should be calibrated and a few modifications should be made in order to make it fully functional.

- b. The telescope will be shown at a departmental show-and-tell this upcoming Monday, and then it will be taken out to Sleaford for mounting in the next month.
- 3. Women in astronomy talk on February 11:
 - a. Well attended, 130 attendees roughly, including many RASC members
- 4. Robotic Telescope Webinar with National:
 - a. Projects for high school students using the robotic telescope (local classes may be participating)
 - b. Planning to use it for outreach, science, and astrophotography
 - c. Various pricing packages available, in general geared toward being affordable for a large community of observers
- 5. Random Acts of Astronomy:
 - a. Next one happening this Saturday night, to see the First Quarter moon (River Landing). Everyone welcome (let Tim Yaworski know).
 - b. Global News may do a story

Presentations:

- Les Dickson: “RASC National websites”
- Jim Goodridge: “Visual Observing for March”
- Rick Huziak: “So What’s Betelgeuse Doing Now?”
- Mike Dolan: “DigiCamControl: FreeWare for your DSLR”

Announcements:

- Speakers needed for upcoming meetings (April, May, June). Contact Rick if you are willing to volunteer.
- Next SSSP meeting is Thursday, March 5th. Camping registration opens late April. Contact Rick with any questions about booking for SSSP.
- Next newsletter deadline: Friday March 6th
- Next meeting: Monday March 16th (with National Executive Director Phil Groff attending)

Meeting adjourned at 9:57 PM. Jim Goodridge, passed as all in favour.

BOOK DRIVE

Astronomy-related book donations are being accepted to the RASC Saskatoon Centre Library at the U of S Observatory during its regular Saturday evening open house, 7:00-9:30 pm in November to February or 8:00-10:30 pm in March.

SASKATCHEWAN SUMMER STAR PARTY 2020

Les Dickson



The Saskatchewan Summer Star Party is the Saskatoon and Regina Centre's premier event for amateur astronomy and public outreach. The 24th SSSP is being held August 19 to 23 at the Cypress Hill Inter-provincial Park Centre Block, 30 km South of Maple Creek on Highway 21.

SSSP is five nights of observing under some of the darkest skies in Canada coupled with a day-time program of which we are very proud. The night-time viewing runs from the evening of Wednesday August 19 through to Monday August 17. Observing sites are the Meadows and Dark Sky

campgrounds. The day time events include the Thursday evening BBQ followed by a public presentation at the Community Center by the Loch Lomond lake. Friday evening will feature short talks. On Saturday we will feature two major speakers, presentation of door prizes, recognition of 10-year and 20-year attendees, and a banquet. On Sunday we will have a pot-luck dinner at the Observatory and Yurt. On Friday and Saturday evenings in the Meadows Campground observing site, we will have observing clinics.

The public outreach events include Solar Observing Friday morning and public star nights at the Observatory in the Dark Sky campground Friday and Saturday nights.

The confirmed speakers for this year include Dr. Fran Bagenal, Professor of Astrophysical and Planetary Sciences at the University of Colorado Boulder. Dr. Bagenal has been a co-investigator with both Juno and New Horizons NASA missions. We also will feature our own Dr. Daryl Janzen as a speaker on Saturday afternoon and Sherry Campbell of the Edmonton Centre as a clinic presenter on astro-sketching Saturday evening. Other speakers will be announced once confirmed.

SSSP is put on each year by members of the Saskatoon and Regina Centres of the RASC, with over 50 volunteers from all over western Canada. This year, I get to chair the organizing committee which includes Andrew Kostiuk, Darrell Chatfield, Donna-Lee May, Ellen Dickson, Greg Fusick, Jim Goodridge, Pierre Schierle, Rick Huziak and Vance Petriew. We would like to thank Terry Lesko for the digital graphic design for our pin this year.

We hope to see more of our members come out to SSSP this year. This is the biggest event we put on each year. We hope you will get involved. See you in August!

For more information:

- SSSP website: <https://sssp.saskatoon.rasc.ca/>
- E-mail: sssp.sk@sasktel.net
- Les Dickson: astrochem@sasktel.net or 306-270-9184 (cell)
- Rick Huziak: 306-665-3392
- Resort in Cypress Hills Park: <http://www.resortatcypresshills.ca>
- Cypress Hills Interprovincial Park: <http://www.cypresshills.com/>



Single 2 minute ISO 3200 picture of the Rosette Nebula, NGC 2237, taken February 27 by Tenho Tuomi with a modified Canon T3i through a Sky-Watcher Equinox 80ED, with a satellite streak through it.

BOOKS FOR SALE

All books are in either new, or like new condition. Retail price in brackets. Please email or text me if you want a particular book and I will bring it to the next meeting or arrange to meet you. All books being sold by Darrell Chatfield. Contact him at novachat@sasktel.net or 306-222-0515.

“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
“Turn Left at Orion”	2000	Dan Davis	B. & W. (29.99) \$15.00
“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

INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE

Rina Rast

On February 11th, in celebration of International Day of Women and Girls in Science, seven Usask students gave a public presentation on women in astronomy. The speakers included me in addition to Simone Hagey, Makayla Heslip, Alex Rosset, Mikayla Rychel, Samantha VanDeventer, and Maia Wallis. We are all undergraduate STEM students at the University of Saskatchewan. We highlighted the accomplishments of historical women, such as Caroline Herschel, Beatrice Tinsley, and Allie Vibert Douglas, in addition to several modern women, including Wendy Freedman, Katie Bouman and Victoria Kaspi. We emphasized struggles they experienced (like gender bias and having strict gender roles imposed on them), and then discussed current conditions in the field, touching on how to

encourage a more inclusive atmosphere in STEM. We ended the talk with personal stories from Simone and a member of the Usask Physics faculty, Kaori Tanaka.



Photo by Colin Chatfield

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. 314)
- THE FINEST NGC OBJECTS (p. 318),
- THE DEEP-SKY CHALLENGE OBJECTS (p. 322),
- DEEP-SKY GEMS (p. 324).

See www.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** for intermediate to advanced members. In addition, **Astroimaging certificates** are available for those members with a photographic bent. See www.rasc.ca/astro-imaging-certificate

RASC OBSERVER'S HANDBOOK 2020

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
Marcel Müller-Goldkuhle	94
Wade Selvig	75
Wayne Schlakohl	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,*

Wayne Schlakohl	55
Jim Goodridge	35

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

The Messier, Finest NGC and David Levy's Deep-Sky Gems lists can be found in the *Observer's Handbook*.

The Explore the Universe list is available here <http://www.rasc.ca/explore-universe>
On-line Messier and Finest NGC lists, charts and logbooks:

<http://www.rasc.ca/observing>

On-line Herschel 400 List:

<http://www.astrolueague.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.shtml>