

Saskatoon Skies

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

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Royal Astronomical Society of Canada
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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.

Speakers are also needed for upcoming meetings. If anyone has a topic they would like to present on, even for a few minutes, please contact Rick Huziak at rickhuziak@shaw.ca.

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.



*Alpha Monocerotid photo from Tara Magee near Bradwell on November 21st, 2019.
Taken with a Canon 7D and Tokina 11-20mm lens at 11mm, f/2.8, ISO 3200, 20 sec.*

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

December 9	RASC Christmas Potluck Supper	Info on website
December 13	Geminid Meteor Shower	Info below
December 22	Ursid Meteor Shower	Info below
December 28	Observer's Group (weather permitting)	Larry Scott

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

RASC Christmas Potluck supper

Open to RASC members and their friends.

Bring your favourite dish and enjoy an evening with members of the
Saskatoon RASC.

6:30 - 9:00pm

Room 175 Physics Building, U of S campus.

(No RASC Executive meeting and no speakers for this event)

Next meeting will be January 20, 2020 at 8:00pm. Executive meeting at
7:00pm.

MINUTES OF NOVEMBER MEETINGS

Rina Rast

Minutes of the Executive Meeting, November 18, 2019

Attendees: Daryl Janzen, Les Dickson, Ellen Dickson, Jim Goodridge, Norma Jensen, Rick Huziak, Darrell Chatfield, Marcell Müller-Goldkuhle, Tenho Tuomi

Meeting called to order by Daryl Janzen at 7:07 PM

Approval of minutes published in November issue (October meeting minutes).

Reports:

Newsletter updates: Speakers list should be added to the newsletter.

Sharing rules for editing access to RASC archive discussed.

Continued discussion on using the Library Thing (app) for the RASC library.

Discussion regarding position of new photographer and board of directors for RASC. This year Tenho Tuomi, Les Dickson, Rick Huziak, _____

December 19th (5:00-7:30 pm) outreach event at a school: opportunity for members/observatory guides to help out. Contact Jim Goodridge for details if you are interested in helping out.

12" Dobsonian in the Sleaford roll-off: Jim Goodridge proposes a project to clean it up and make a trolley for it.

Other Sleaford issues:

- Discussion regarding extension cords.
- Update on internet servers: still waiting on IT services to get out there.
- Update on robotic telescope: parts should hopefully arrive by January.

Discussion regarding the roll-off roof.

Discussion regarding Meade 16" in the roll-off: Should be made operational (focuser, guide scope, gear issues) and then it could be used for photometry.

Call to adjourn the meeting by Jim Goodridge, seconded by Norma Jensen, approved by all.

Meeting adjourned at 7:50 PM.

Minutes of General Meeting, November 18, 2019

Meeting called to order by Daryl Janzen at 8:16 PM.

Motion to adopt the minutes published in November 2019 newsletter: passed.

Calendars: sign up to get a 2020 calendar (they will be ordered tomorrow).

Recap regarding extension cords and internet access at Sleaford, as discussed in the Executive Meeting.

Election for club photographer and Board of Directors:

- Board of Directors: Motion to nominate Les Dickson, Norma Jensen, Ron Waldron and Tenho Tuomi for the upcoming year. Motion passed.
- Motion to nominate Mike Dolan as photographer, seconded by Ron Waldron; passed.
- Motion to appoint auditor by Ron Waldron, seconded by Colin Chatfield. Motion passed.
- Motion to dispense with auditor for ensuing year: all in favour; passed.

Outreach report by Jim Goodridge:

- Power outage caused issues at last observing session after the October 2019 meeting.
- Sleaford 2019 was cancelled due to poor weather.
- Dark skies at the creek: 80-100 people turned out, 2 speakers even though it was a cloudy night.
- Transit of Mercury on November 11th was a success in spite of the cold: about 80 people at the bridge, and also a couple hundred people at the observatory.

Other events: SSSP first official meeting for upcoming year occurring this week at Les Dickson's place. Contact him for details.

Discussion regarding star wheels for the upcoming potluck. These are available for outreach events.

Discussion regarding Astronomy Day at next year's Farmer's Market. Norma Jensen suggests keeping to River Landing. Jim Goodridge suggests that Random Acts of Astronomy could replace the Farmer's Market outreach.

Presentations: What's Up this Month, by Jim Goodridge
 National Council Report, by Les Dickson
 Observing and Measuring Double Stars, by Rick Huziak

Speakers needed for upcoming meetings. Contact Rick Huziak if interested.

Next newsletter deadline is December 1st.

Next meeting is a potluck on December 9th (no speakers needed).

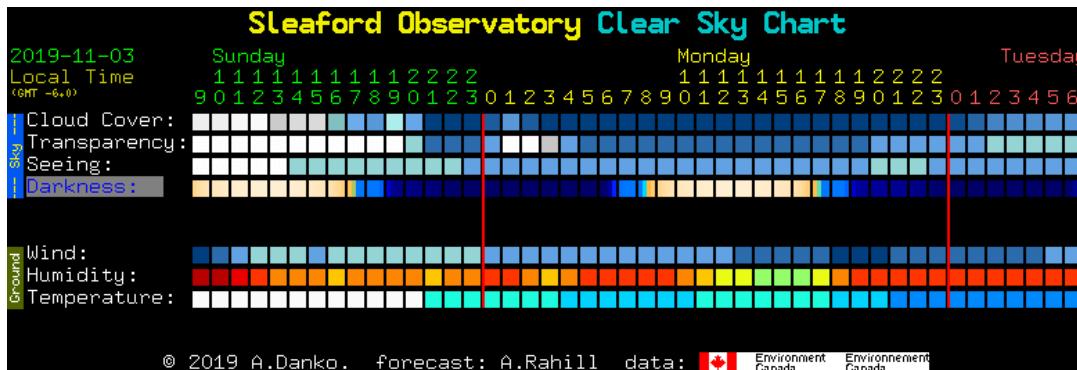
Meeting adjourned at 10:03 PM.

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

DECEMBER NIGHT SKY EVENTS AND INFO

Geminid Meteor Shower

December 13th (Moon 95% illuminated, setting at 2327hrs) to the 14th (Moon is 89% illuminated, setting at 0010hrs)

Look to the eastern sky toward the Gemini constellation

<https://www.space.com/34921-geminid-meteor-shower-guide.html>

Ursid Meteor Shower

December 22nd (Moon 10% illuminated, setting at 1458hrs)

Look between Ursa Major and Ursa Minor

<https://www.space.com/34973-ursid-meteor-shower-guide.html>

Meteor shower info - <https://www.imo.net/files/meteor-shower/cal2019.pdf>

December Observing Challenge by Jim Goodridge

M45 (Taurus)

M42 (Orion)

M36

M37

M38 (Taurus)

M35 (Gemini)

M34 (Perseus)

M31 (Andromeda)

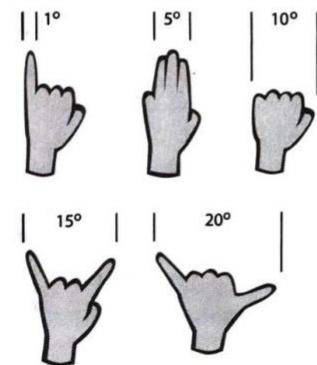
NGC752 (Andromeda)

NGC1647 (Taurus)

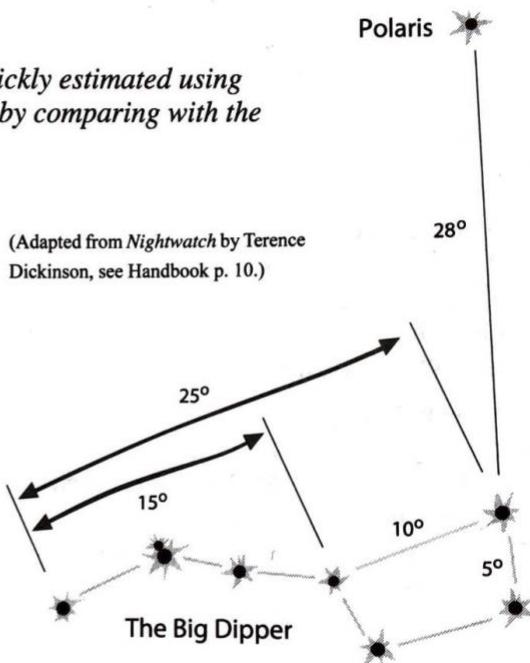
M33 (Triangulum) - try this with 10x50 binoculars. It's high, overhead, and shows up fairly well. Don't get frustrated if not seen at first as it has very low surface brightness. Keep trying and eventually it should be seen as a very large, dim cloud.

Images on the next few pages taken with permission from the 2019 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



(Adapted from *Nightwatch* by Terence Dickinson, see Handbook p. 10.)



THE SKY FOR DECEMBER

		Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Sun
RA	1	15h 07m	18h 26m	14h 21m	17h 57m	19h 17m	2h 04m	23h 09m	16h 26m
	11	16h 01m	19h 20m	14h 47m	18h 07m	19h 21m	2h 03m	23h 09m	17h 09m
	21	17h 04m	20h 13m	15h 14m	18h 17m	19h 26m	2h 02m	23h 09m	17h 54m
Dec	1	-15° 13'	-24° 46'	-13° 24'	-23° 18'	-22° 10'	+12° 03'	-6° 37'	-21° 40'
	11	-19° 30'	-23° 53'	-15° 32'	-23° 18'	-22° 03'	+11° 58'	-6° 35'	-22° 56'
	21	-22° 56'	-21° 49'	-17° 29'	-23° 16'	-21° 54'	+11° 53'	-6° 33'	-23° 26'
Dist	1	1.07	1.44	2.39	6.15	10.78	19.01	29.79	0.986
	11	1.26	1.39	2.33	6.19	10.87	19.12	29.96	0.985
	21	1.37	1.34	2.26	6.21	10.95	19.25	30.13	0.984
Mag	1	-0.6	-3.9	1.7	-1.8	0.6	5.7	7.9	
	11	-0.6	-3.9	1.7	-1.8	0.6	5.7	7.9	
	21	-0.6	-3.9	1.6	-1.8	0.6	5.7	7.9	
Size	1	6.3"	11.6"	3.9"	32.1"	15.4"	3.7"	2.2"	32' 26"
	11	5.3"	12.0"	4.0"	31.8"	15.3"	3.7"	2.2"	32' 29"
	21	4.9"	12.5"	4.1"	31.7"	15.2"	3.6"	2.2"	32' 31"

Moon: On December 0 at 0h UT*, Sun's selenographic colongitude is 306.27° and increases by 12.2° each day thereafter.



Greatest N. declination on the 14th (+23.2°).

Greatest S. declination on the 27th (-23.2°).

Libration in longitude: E. limb most exposed on the 26th (+5.0°),

W. limb most exposed on the 12th (-4.7°).

Libration in latitude: N. limb most exposed on the 7th (+6.8°),

S. limb most exposed on the 20th (-6.8°).

Annular solar eclipse on Dec. 26, visible from western Australia, Asia, the Middle East, eastern Europe, extreme eastern Africa, the north Indian Ocean, and the Pacific Ocean.

Mercury: Visible in the morning sky until it becomes too close to the Sun to be seen around the 25th. Geometry is favourable for Northern Hemisphere observers early in the month.

Venus: Still in the waning gibbous phase as it approaches Earth in the evening sky, Venus begins to rise up the sky during December from declination -25° to -18° and starts to set the stage for what will be a splendid show for Northern Hemisphere observers in early 2020. Passes 2° south of Saturn on the 11th. The waxing crescent Moon passes just 1° to its south on the 29th (evening of the 28th in the Western Hemisphere).

Mars: Still small and distant, but continues its rise in the morning sky, reaching 40° elongation from the Sun just before year's end. Moves from Virgo into Libra early in the month. The waning crescent Moon passes 4° to it north on the 23rd.

Jupiter: Visible with difficulty low in the southwest early in the month. Fades into the sunset by midmonth, and is in conjunction with the Sun on the 27th, not far from the winter solstice point.

Saturn: Visible with difficulty very low in the southwest early in the month for Northern Hemisphere observers, then fades into evening twilight as the month progresses.

Uranus: In the evening sky among the stars of Aries, setting in the overnight hours. Meridian transit times at Greenwich on the 1st, 11th, 21st, 31st – 21:23, 20:42, 20:02, 19:22 UT*.

Neptune: In the southwestern evening sky in Aquarius, setting before midnight. Meridian transit times at Greenwich on the 1st, 11th, 21st, 31st – 18:28, 17:49, 17:10, 16:31 UT*.

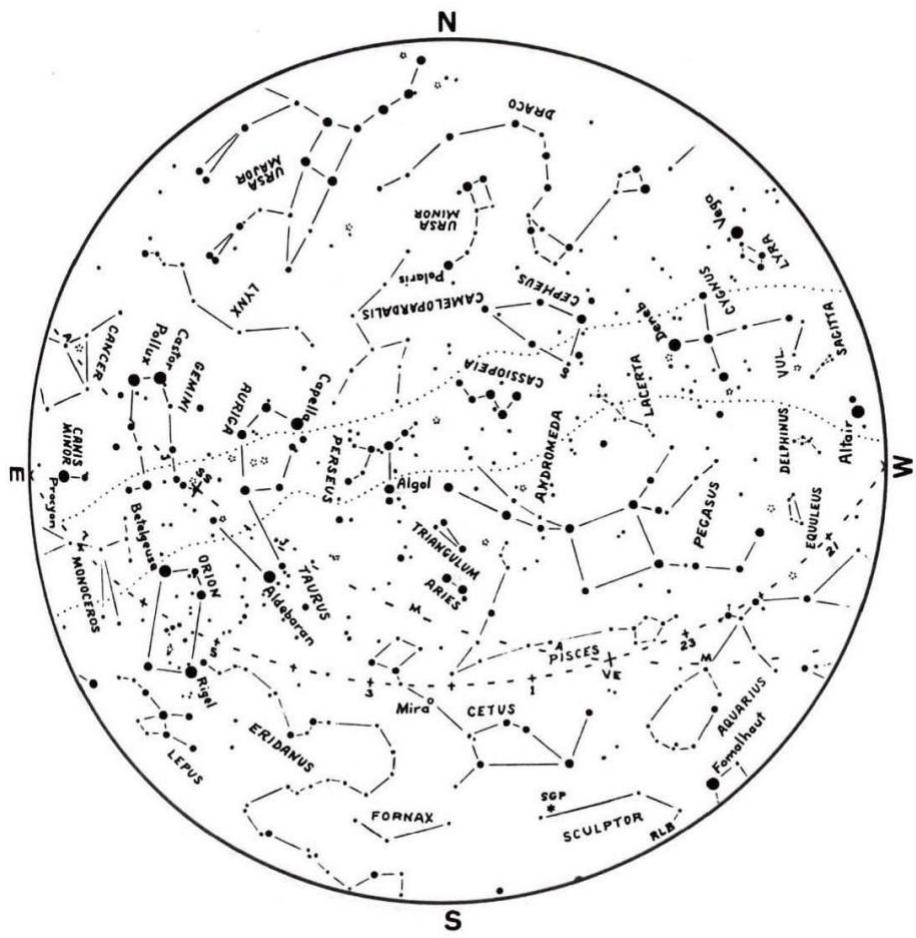
*See p. 94, the bold-faced sentences of the first paragraph.

Time (UT)			DECEMBER EVENTS	Jupiter's Satellites	
	d	h m		West	East
Sun.	1				
Mon.	2	7 28	Algol at minimum		1.0
Tue.	3	2	Pallas in conjunction with the Sun		2.0
Wed.	4	6 58	First quarter		3.0
Thu.	5	4	Moon at apogee (404 446 km)		4.0
		4 17	Algol at minimum		5.0
Fri.	6				6.0
Sat.	7				7.0
Sun.	8	1 06	Algol at minimum		8.0
		11	Uranus 5° N of Moon		9.0
Mon.	9				10.0
Tue.	10	21 55	Algol at minimum		11.0
Wed.	11	4	Venus 1.8° S of Saturn		12.0
Thu.	12	5 12	Full Moon		13.0
Fri.	13	4	Moon 1.5° S of M35		14.0
		18 44	Algol at minimum		15.0
Sat.	14	19	Geminid meteors peak		16.0
Sun.	15	16	Moon 1.0° N of Beehive (M44)		17.0
Mon.	16	15 33	Algol at minimum		18.0
Tue.	17				19.0
Wed.	18	20	Moon at perigee (370 265 km)		20.0
Thu.	19		Mercury at descending node		21.0
		4 57	Last quarter		22.0
		12 22	Algol at minimum		23.0
Fri.	20		Venus at greatest heliocentric lat. S		24.0
Sat.	21				25.0
Sun.	22	4 19	Solstice		26.0
		9 11	Algol at minimum		27.0
Mon.	23	2	Mars 4° S of Moon		28.0
		3	Ursid meteors peak		29.0
Tue.	24				30.0
Wed.	25	6 00	Algol at minimum		31.0
Thu.	26	5 13	New Moon (lunation 1200)		
			Annular Solar Eclipse (p. 133)		
Fri.	27	12	Saturn 1.2° N of Moon		
		15	Pluto 0.6° N of Moon, occultation†		
		19	Jupiter in conjunction with the Sun		
Sat.	28	2 49	Algol at minimum		
Sun.	29	2	Venus 1.0° N of Moon, occultation‡		
Mon.	30		Mercury at aphelion		
		23 38	Algol at minimum		
Tue.	31				

†S. America, South Georgia, parts of Antarctica, Kerguelen Is., S tip of Africa, S Madagascar

‡Antarctica, southern tip of S. America





Rick Huziak speaking about light pollution during the Beaver Creek Dark Sky Night, October 26, 2019. Photo courtesy Colin Chatfield

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.

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

NOTES FROM THE TRANSIT OF MERCURY

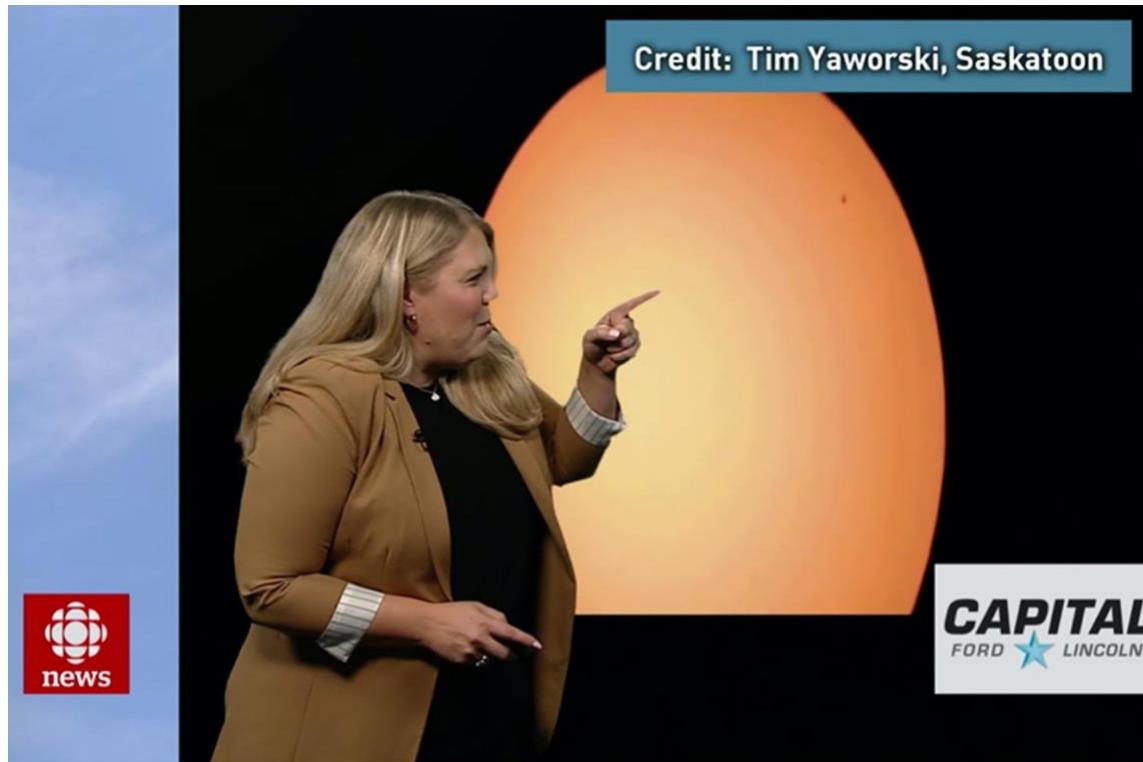
Tim Yaworski (with photos by Tim and Colin Chatfield)

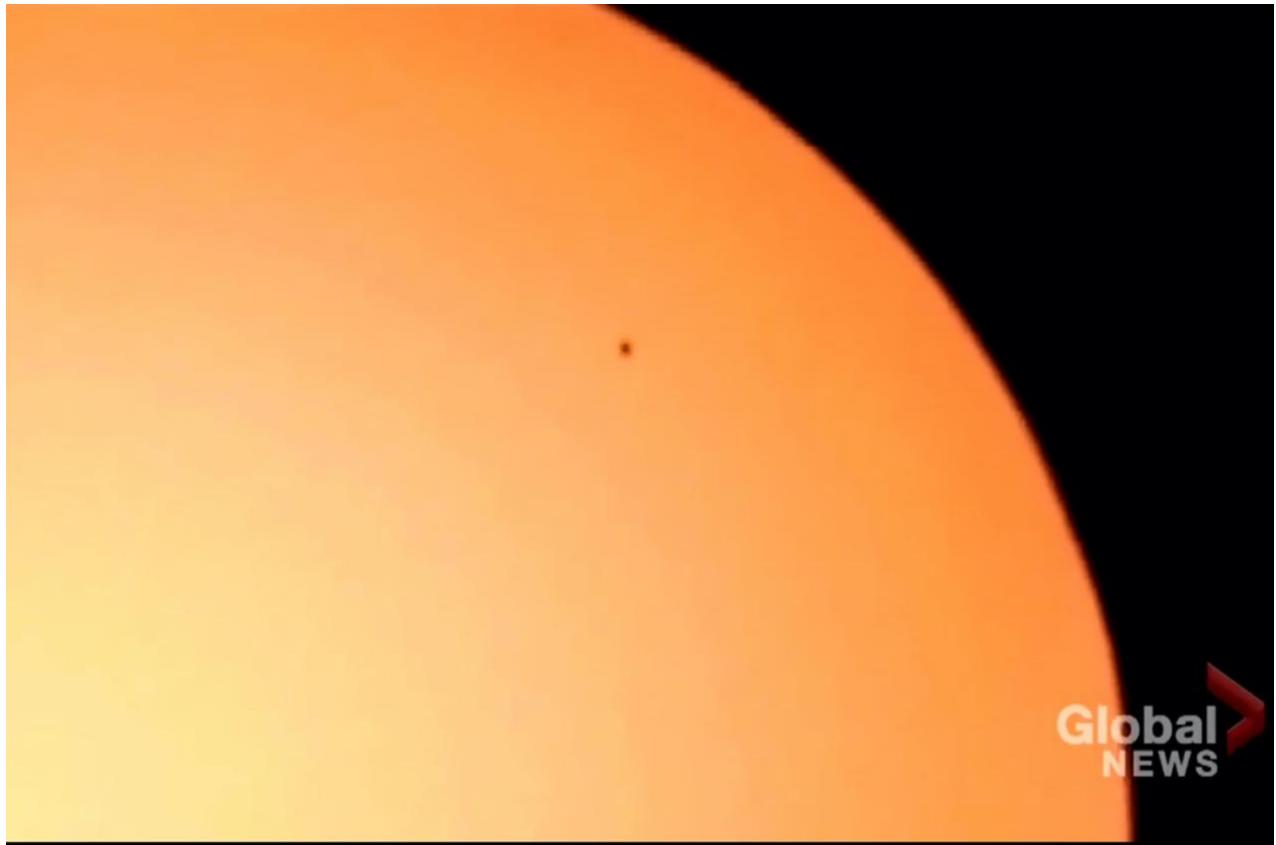
November 11 was the date for a rare celestial occurrence, this time in the daytime. The Mercury Transit 2019 was visible across North America that the Saskatoon Centre of the RASC teamed up with the University of Saskatchewan College of Physics to give the public an opportunity to safely view this event.

A transit occurs when a planet passes between the earth and the sun and is visible as a silhouette as it moves across in its orbit. This can only be safely viewed with a high-powered telescope with a solar filter. Because of that most people would not get a chance to see this rare event, which only happens 13 times a century. In fact, the next one will not be visible in Canada until 2049.

A group of astronomers and eight telescopes at two locations in Saskatoon to allow the public to see the transit. To promote it, the Friday before the event CTV filmed a spot with Tim Yaworski of the Centre for the evening news broadcast and Tim also made a live appearance on the Global Morning News. Patricia Gakis, another RASC member, was featured on the CBC Saskatoon Morning radio broadcast as well as being interviewed by the local daily paper.

The actual transit was underway several hours before sunrise with the last half visible in Saskatoon from sunrise to noon. The day was clear and cold with the temperature at -22c plus a mild wind chill. Despite the cold weather, over 250 people showed up at the two locations. Global also send a camera crew out to cover the event for the evening broadcast. A time-lapse video Tim shot of the transit was shown on the evening news broadcasts of Global Saskatoon, CBC Saskatchewan as well as CBC North in the NWT. As the day was also Remembrance Day, a brief, solemn service was held at 11am at both locations to honour those who sacrificed so much to allow us the freedoms we enjoy today.







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 2019

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

Ron Waldron	108
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,*

Wayne Schlapkohl	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>