

# 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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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)
- borrow the Centre's projector to give astronomy outreach presentations – contact Les Dickson at [astrochem@sasktel.net](mailto:astrochem@sasktel.net)
- rent the Centre's Telescopes <https://www.usask.ca/rasc/telescopes.html>
- use of the Centre library
- SkyNews Magazine (bimonthly)

### SASKATOON CENTRE'S MAIN OFFICERS:

**President** – Ron Waldron

**Vice-President** – Mike Dolan

**Secretary** – Rick Huziak

**Treasurer** – Norma Jensen (until Jan. 2021)/Donna-Lee May (Jan. 2021 onward)

**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](mailto:novachat@sasktel.net).

## NEWSLETTER INFO

**Newsletter Editor** – Colin Chatfield

**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@gmail.com](mailto: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](mailto:colcha@gmail.com) for rates. Members can advertise non-commercial items for free.



*Comet NEOWISE taken by Tara Magee*



**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.

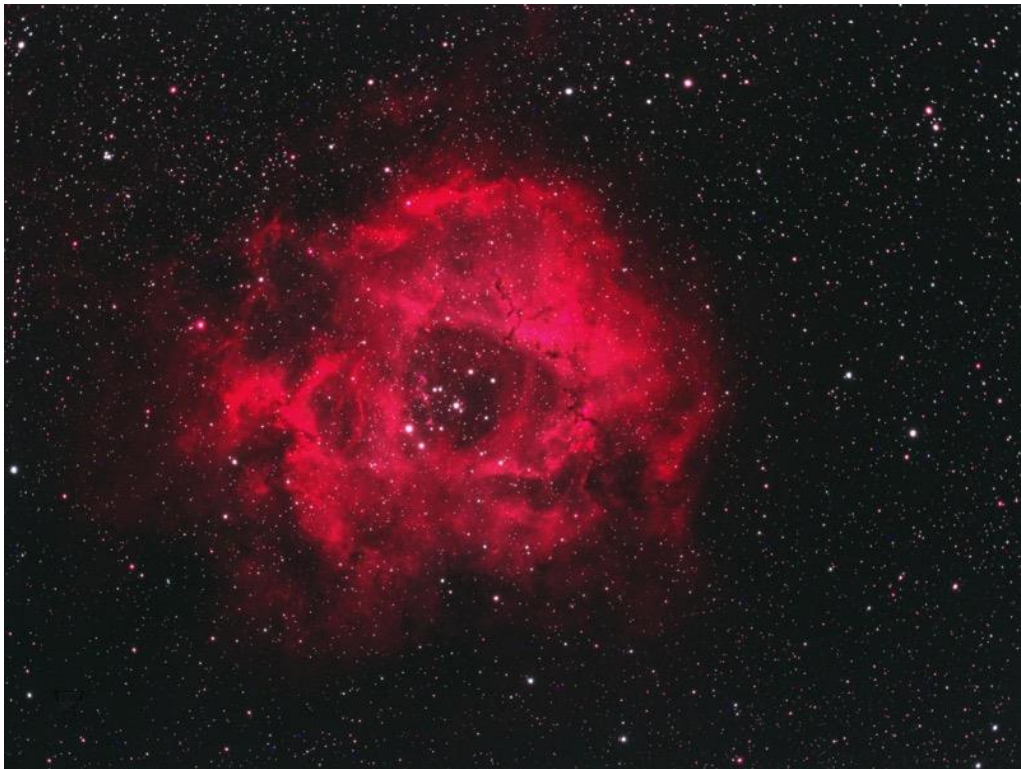
**Observatory Hours.**

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

*Temporarily Closed. Check the website for updates!*

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

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



*Rosetta Nebula taken by Anthony Tony with a Meade 80mm triplet, Orion Sirius EQG Pro mount, 6 mins exposure of 20 shots with an Olympus Astro modified camera*

# RASC CALENDAR OF EVENTS & MEETING INFO

<b>March 13</b>	<b>Messier Marathon - Sleaford Observatory</b>	See website
<b>March 15</b>	<b>RASC General Meeting - 7:00pm (info below)</b>	Ron Waldron

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: <http://www.usask.ca/rasc/activities.html>

## March RASC General Meeting

for all members and guests

**Join us on March 15, 2020 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).

8:00pm - **Main Program**

**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.

**“Astronomical Jeopardy: A Game for Astronomers” - Ron Waldron**



## MARCH MEETING FUN

Ron Waldron

Always wanted to play jeopardy but afraid they may ask you a question that is out of your comfort zone? Worry no more. Our March RASC General Meeting is just for you, **ASTRO Jeopardy** with only questions about our universe. Come online and participate. It is guaranteed to be fun and who knows ... you may be the first winner on **ASTRO Jeopardy**!

## SPEAKERS FOR MEETINGS

Rick Huziak

No soapbox lecture this month. The Centre needs speakers for April, May, June and September - plain and simple. Email [rickhuziak@shaw.ca](mailto:rickhuziak@shaw.ca) to volunteer to give a short or long talk. We want to hear about what you are doing! Thanks in advance.



*Mars, Moon, and ISS taken by Gord Sarty*

# FEBRUARY OBSERVING

Tenho Tuomi

February was too cold for much astrophotography, though I did manage to photograph two faint new comets that were discovered in January. However the frost made beautiful sundogs and solar halos on the coldest days. This picture was taken February 8 at -29C, with the Canon T5i camera and F/8 10mm lens, 1/1250 sec at ISO 100.



*55mm tripod picture of Aldebaran and the Hyades on the left  
and Mars and the Pleiades (M45) on the right*

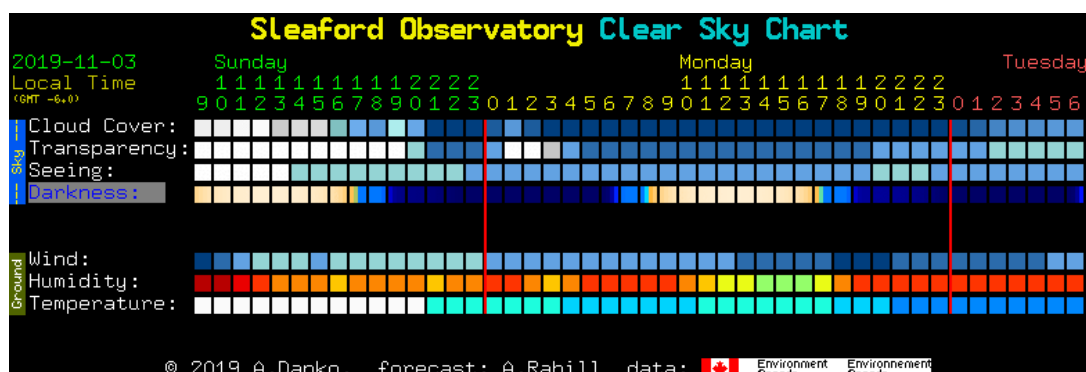


# CLEAR SKY AND WEATHER INFO

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](http://www.weather.gc.ca/astro)



Saskatchewan Light Abatement Committee -

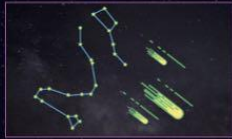
<http://myotherlife.net/slpac/>



[www.darksky.org](http://www.darksky.org)



# 2021 CELESTIAL CALENDAR



**JAN 2-3**

**QUADRANTIDS METEOR SHOWER**

Up to 40 meteors per hour will appear to radiate from the constellation Bootes.



**JAN 24**

**MERCURY AT GREATEST EASTERN ELONGATION**

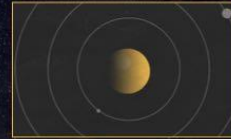
Look for the planet low in the western sky just after sunset.



**MAR 6**

**MERCURY AT GREATEST WESTERN ELONGATION**

Look for it low in the east just before sunrise.



**MAR 20**

**VENUS AT GREATEST WESTERN ELONGATION**

Look for the bright planet in the eastern sky before sunrise.



**APR 27**

**FULL MOON, SUPERMOON**

The Moon will be at its closest approach to Earth and will look slightly larger and brighter than normal.



**MAY 6-7**

**ETA AQUARIDS METEOR SHOWER**

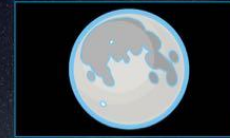
Up to 60 meteors per hour will appear to radiate from the constellation Aquarius.



**MAY 17**

**MERCURY AT GREATEST EASTERN ELONGATION**

Look for the planet low in the western sky just after sunset.



**MAY 26**

**FULL MOON, SUPERMOON**

The Moon will be at its closest approach to Earth and will look slightly larger and brighter than normal.



**MAY 26**

**TOTAL LUNAR ECLIPSE**

The Moon will completely pass through the Earth's shadow, and will darken to a red hue. Visible in western North America, parts of eastern Asia, Japan, Australia, and the Pacific Ocean.



**JUN 10**

**ANNULAR SOLAR ECLIPSE**

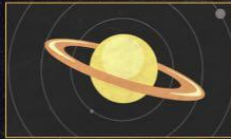
Viewable in parts of eastern Russia, Canada, Partial eclipse in Russia, northeastern United States, and Europe. Approved solar glasses or telescope filters required during the entire eclipse.



**JUN 24**

**FULL MOON, SUPERMOON**

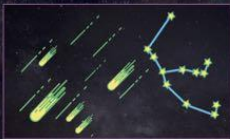
The Moon will be at its closest approach to Earth and will look slightly larger and brighter than normal.



**AUG 2**

**SATURN AT OPPOSITION**

It's the best night of the year to view Saturn, which will be at its very brightest and visible all night.



**AUG 12-13**

**PERSEIDS METEOR SHOWER**

Up to 60 meteors per hour will appear to radiate from the constellation Perseus.



**AUG 19**

**JUPITER AT OPPOSITION**

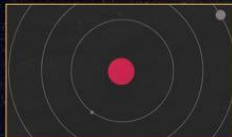
It's the best night of the year to view Jupiter, which will be at its very brightest and visible all night.



**AUG 22**

**FULL MOON, SUPERMOON**

The Moon will be at its closest approach to Earth and will look slightly larger and brighter than normal.



**SEPT 14**

**MERCURY AT GREATEST EASTERN ELONGATION**

Look for the planet low in the western sky just after sunset.



**OCT 29**

**VENUS AT GREATEST EASTERN ELONGATION**

Look for the bright planet in the western sky after sunset.



**NOV 19**

**PARTIAL LUNAR ECLIPSE**

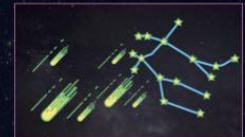
The moon will partially pass through the Earth's shadow, and will darken. Visible in eastern Russia, Japan, North America, Central America, and South America



**DEC 4**

**TOTAL SOLAR ECLIPSE**

Day turns to night for observers in parts of South Africa, Antarctica, and the southern Atlantic Ocean.



**DEC 13-14**

**GEMINIDS METEOR SHOWER**

Up to 120 meteors per hour will appear to radiate from the constellation Gemini.



Evening Sky: Aug - Dec  
Morning Sky: Feb - Aug  
Opposition: August 19



Evening Sky: Aug - Dec  
Morning Sky: Feb - Aug  
Opposition: August 2

## DEEP SKY CHECKLIST

### SPRING

- Beehive Cluster (M44)
- Leo Triplet Galaxies (M65, M66, & NGC 3628)
- Whirlpool Galaxy (M51)
- Bode Galaxy (M81)
- Cigar Galaxy (M82)
- Double Star, Mizar & Alcor
- Sombrero Galaxy (M104)
- Globular Cluster (M3)

### SUMMER

- Milky Way
- Hercules Cluster (M13)
- Ring Nebula (M57)
- Lagoon Nebula (M8)
- Trifid Nebula (M20)
- Sagittarius Cluster (M22)
- Eagle Nebula (M16)
- Omega Nebula (M17)
- Dumbbell Nebula (M27)
- Albireo Double Star
- Wild Duck Cluster (M11)

### AUTUMN

- Andromeda Galaxy (M31)
- Double Cluster (NGC869, NGC884)
- Globular Cluster (M15)

### WINTER

- Orion Nebula (M42)
- Pleiades Cluster (M45)
- Beehive Cluster (M44)
- Auriga Open Clusters (M36, M37, M38)
- Lepus Globular Cluster (M79)
- Hyades Cluster





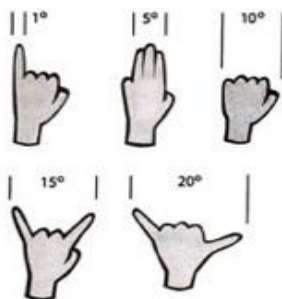
*Moonrise taken March 2, 2021 by Colin Chatfield*

## MARCH NIGHT SKY EVENTS AND INFO

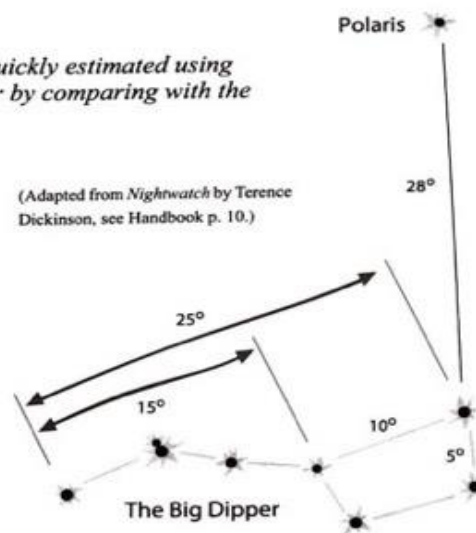
Images on the next few pages taken with permission from the 2020 Observer's Handbook. It can be obtained by joining the RASC here <http://rasc.ca/join> or ordered from <https://secure.rasc.ca/Portal/Shop/RASC/Store/StoreMain.aspx?Category=CURRPUB>

### HANDY SKY MEASURES

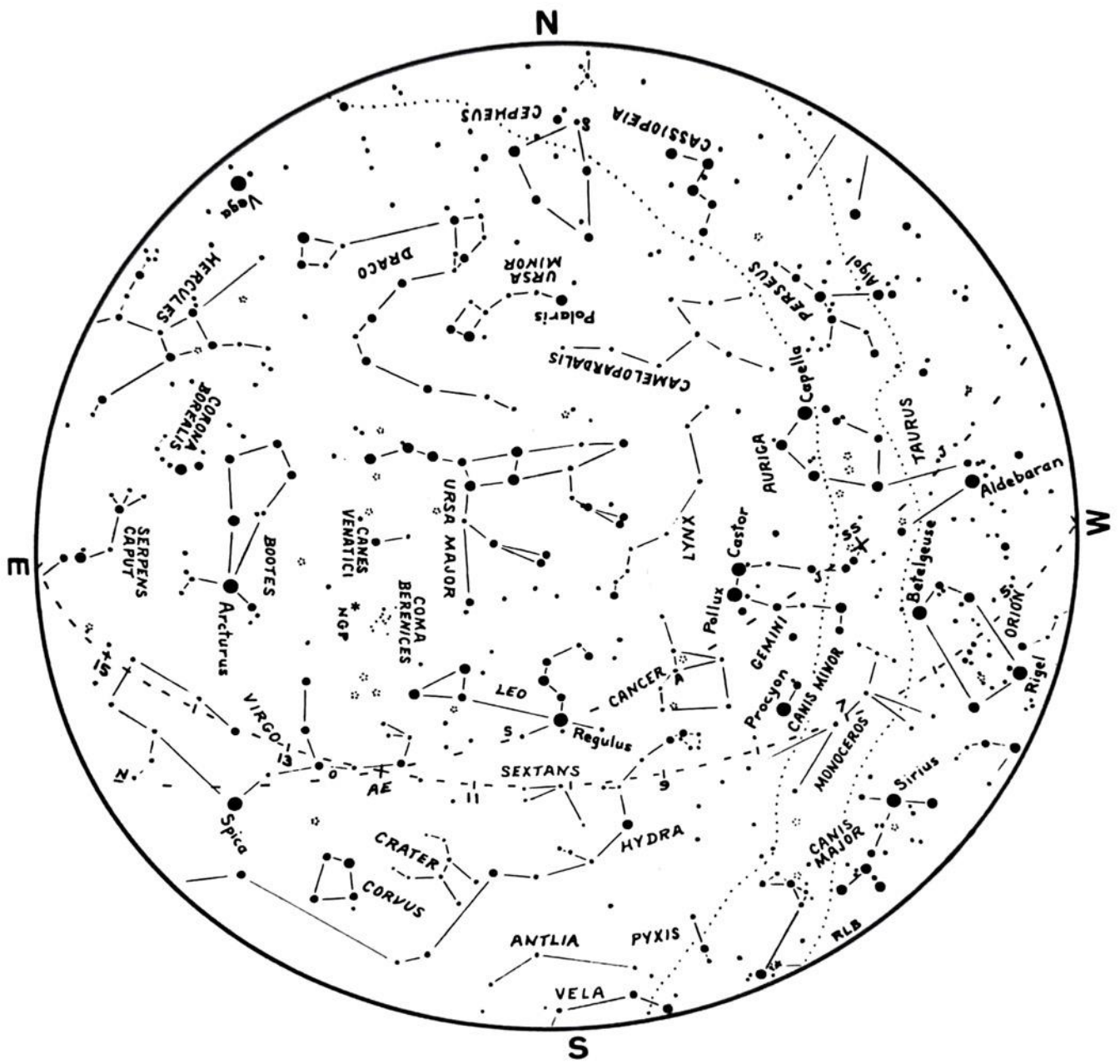
*Angular measure in the sky can be quickly estimated using the fingers of an outstretched arm, or by comparing with the star separations in the Big Dipper.*


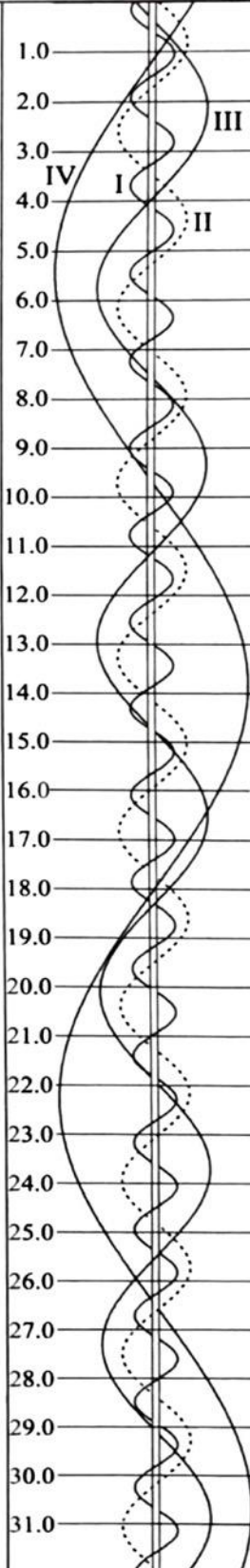



















(Adapted from *Nighthwatch* by Terence Dickinson, see Handbook p. 10.)



RASC OBSERVER'S HANDBOOK 2020



Time (UT)			MARCH EVENTS		Jupiter's Satellites	
d	h	m			West	East
Mon.	1		<b>Zodiacal Light vis. in N lat. in W after evening twilight for next two weeks</b>		1.0	
Tue.	2	5	Moon at perigee (365 423 km)		2.0	
		5 19	Algol at minimum		3.0	
Wed.	3		Mercury at descending node		4.0	
Thu.	4	18	Vesta at opposition		5.0	
Fri.	5	2 08	Algol at minimum		6.0	
		7	<b>Mercury 0.3° N of Jupiter</b>		7.0	
Sat.	6	1 30	<b>Last quarter</b>		8.0	
		11	<b>Mercury greatest elongation W (27°)</b>		9.0	
Sun.	7	22 57	Algol at minimum		10.0	
Mon.	8				11.0	
Tue.	9	23	Saturn 4° N of Moon		12.0	
Wed.	10	16	Jupiter 4° N of Moon		13.0	
		19 46	Algol at minimum		14.0	
Thu.	11	0	Neptune in conjunction with the Sun		15.0	
		1	Mercury 4° N of Moon		16.0	
Fri.	12				17.0	
Sat.	13	10 21	<b>New Moon (lunation 1215)</b>		18.0	
		16 35	Algol at minimum		19.0	
Sun.	14		<b>DAYLIGHT SAVING TIME BEGINS</b>		20.0	
			Venus at greatest heliocentric lat. S		21.0	
			Mercury at aphelion		22.0	
Mon.	15				23.0	
Tue.	16	13 24	Algol at minimum		24.0	
Wed.	17	2	Uranus 3° N of Moon		25.0	
Thu.	18	5	Moon at apogee (405 252 km)		26.0	
Fri.	19	10 13	Algol at minimum		27.0	
		18	<b>Mars 1.9° N of Moon</b>		28.0	
Sat.	20	9 37	<b>Equinox</b>		29.0	
Sun.	21	14 40	<b>First quarter</b>		30.0	
		17	Moon 0.7° N of M35		31.0	
Mon.	22	7 02	Algol at minimum			
Tue.	23	0	Mars 7° N of Aldebaran			
Wed.	24					
Thu.	25	3 51	Algol at minimum			
Fri.	26	7	Venus in superior conjunction			
Sat.	27					
Sun.	28	0 40	Algol at minimum			
		18 48	<b>Full Moon</b>			
Mon.	29					
Tue.	30		<b>Zodiacal Light vis. in N lat. in W after evening twilight for next two weeks</b>			
		6	Moon at perigee (360 309 km)			
		21 29	Algol at minimum			
Wed.	31					



# MINUTES OF FEBRUARY MEETINGS

Rick Huziak

## Minutes of the Executive Meeting RASC Saskatoon Centre

February 22, 2021 - 7:00 pm Online (ZOOM)

Recorded by Rick Huziak, Secretary

**Attendees:** Ron Waldron, Mike Dolan, Donna-Lee May, Les Dickson, Darrell Chatfield, Rick Huziak, Mark de Jong, Colin Chatfield, Tara Magee, Jim Gorkoff

1. Call to order 7:03 PM – Ron Waldron.
  2. Call for additional announcements/items to add to agenda – none requested.
  3. **Committee Reports** – SSSP Committee report will be added to New Business (but later deferred to the General meeting.)
  4. **Approval of the January minutes** as written in February newsletter – **Moved:** Les Dickson, **Seconded:** Mike Dolan. **CARRIED.**
  5. **Old business**
    - Darrell Chatfield & Colin Chatfield investigated and found no unauthorized SSSP or Centre websites.
    - Jim Gorkoff – Centre should maintain some vigilance for fraudulent sites since use of RASC logos are National brand items.
  6. **Update on Sleaford 16-inch telescope refurbishment at the U of S** – Daryl Janzen has paperwork done for U of S to provide access during Covid-19. We are expected to have access within a few weeks and until the end of August.
  7. **New business:**
    - Treasurer's Report** – Donna Lee May
      - \$22,827.02 total accounts consisting of:
        - term deposits: \$7,496.92
        - chequing: \$15,330.15
- Motion for approval of \$12.98** (stamps/envelopes) to reimburse costs for Treasurer – Donna-Lee May, **Seconded** – Darrell Chatfield. **CARRIED.**

**Budgets:** Donna-Lee requests that those spending money submit budgets for approval:

- Newsletter copying/ mailing: Les Dickson, Colin Chatfield - \$500 approved (but may need \$650)
- 16" Telescope Committee - Daryl, Rick, Yannis - \$800 (approved)
- Sleaford Maintenance, Insurance – Darrell Chatfield - TBD
- Sleaford / U of S expenses - Daryl Janzen – TBD
- SSSP – Les - TBD

8. **Centre Bylaws current status and update – Jim Gorkoff** – Centre Bylaws will be based on RASC National bylaws and provincial legislation. The Constitution Committee (Les Dickson, Donna-Lee May with ex-officio Ron Waldron and guest Rick Huziak) provided initial feedback to Jim's questions in a Special Meeting in 21 Feb. Jim will use that feedback to create new Centre bylaw draft for the March meeting. Clarifications discussed with Jim: Quorum can be 5 members, officers can be directors and vice versa, officers (President, Vice-president, Secretary, Treasurer) will have 2-year terms.

**Jim is refiling the Saskatoon Centre Incorporated** with Government of Saskatchewan (since the registration has lapsed.) There will be a registration fee for application that Jim will forward to Donna-Lee. **Note: Saskatoon Centre is a not-for-profit corporation but we are not charitable.**

9. **Update on our Centre e-mail address** – Michael Dolan. [sk\\_centre@RASC.ca](mailto:sk_centre@RASC.ca) is directed to Mike Dolan. **Donna-Lee** – why don't separate officers have their own addresses? **Les Dickson** – National wants one email.

10. **Rebuilding and modernizing our local website** – Michael Dolan – website needs some updating, but any rebuilding of site is Tabled.

11. **Call to adjourn. Donna-Lee** – motion to adjourn. **CARRIED.**

**Minutes of the Annual General Meeting RASC Saskatoon Centre**  
**February 22, 2021 - 8:00 pm Online (ZOOM)**  
Recorded by Rick Huziak, Secretary

**15 members attending at the beginning of meeting, 21 at end.**

1. Call to order 8:04 PM – Ron Waldron
2. **Adoption of January General Meeting** minutes as published in the February 2020 newsletter. Motion to approve: Tim Seconded. Mike Dolan. **Carried**
3. **Introduction of Guests** by Mike Dolan: welcome Warren, Marcella and Chloe Zatwarniski.
4. **Treasurer's Report** – Donna-Lee May – amounts of accounts provided (see Executive Meeting for details). Requests committees provide a budget to Donna-Lee so expenses can be allocated and tracked.

**SSSP Report** – Les Dickson – SSSP is leaning toward a minimalist star party (no speakers, food services, etc.) due to Covid-19. SSSP will poll potential attendees get a gauge of who will attend anyway. Rick Huziak has been talking to park about camping plans. Observing will likely be at the Dark-sky Campground with only camping in the Meadows.

5. **Highlights of the Executive Meeting** – Ron Waldron  
– Jim Gorkoff is drafting bylaws (see Executive minutes for details)
6. **Sharing / Networking Time** – all members (10 min max)
7. **Speakers:**

**Rick Huziak - The RASC's 2021 Night Sky Almanac - A Book Report**  
**Tim Yaworski - The National Astrophotography Certificate Program**

**Adjournment – Moved:** Ron Waldron 8:55 pm. **CARRIED.**

## BOOKS FOR SALE

All books are in either new, or like new condition. Retail price in brackets. Please email at [novachat@sasktel.net](mailto: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.

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

## SSSP 2021 UPDATE

Les Dickson

The current very fluid COVID-19 situation in Canada has presented some challenges in planning for our star party in August. We have had some interesting discussions with the management of the Cypress Hills Interprovincial Park (CHIPP) and the Resort at Cypress Hills about what we could hope to do this year. Below is a description of our current situation and how we propose to proceed.

*Our Plan:* We intend to hold a star party this year, but since significant COVID-based restrictions may still be in place at the time of the star party, for this year only, we propose to hold a star party with no indoor and limited outdoor programming. There would be no presentations nor banquet in the Resort's Wapiti Room. Any presentations would be held in the outdoor Amphitheatre, if allowed. A BBQ may be possible but that depends on restrictions present at the time. What type of star party we can hold depends entirely on how many campsites we can fill in the Meadows Campground.



*Scenario 1:* If we have a normal attendance, SSSP will run normally utilizing sites #31 to #143, and we would be able to observe from the Meadows.

*Scenario 2:* If we have a smaller than usual attendance, we will have a reduced number of campsites available and much of the top part of the Meadows will be redesignated as general public camping. SSSP attendees would camp in the southwest part of the Meadows (where horizons are poor or non-existent) and observe from the open-field Dark Sky Campground (DSC). Since no observing would happen in the Meadows, attendees could use their campsites in any manner that they want and most of the Meadows would not be blacked out.

*About the Dark Sky Campground:* There is no power at the DSC, but people can charge batteries at the Meadows site daily, and there is local power at the observatory and yurt, plus two flush washrooms by the yurt. At the DSC, there is ample open area for people to set up their equipment at social distances. Visiting between friends will likely be restricted by group size, but casual visiting is expected to be unrestricted. The park would mow a walkway between Meadows and the DSC to facilitate foot traffic back and forth between the two locations, though you could also drive between locations to load equipment. Twenty-four-hour security for scope set-ups would be provided. There are also about 16 small sites there for rustic camping for those who may want to camp close to their equipment.

*The Survey:* We have sent an email out to everyone who is on our SSSP mailing list inviting them to participate in a survey. Some of you may have received this email. The results of the survey will allow us to finalize our arrangements with the Park and Resort and plan our programming accordingly. Check our webpage at <https://sssp.saskatoon.rasc.ca/> shortly after March 15 to see what direction our Star Party will take.





*Aurora taken by Colin Chatfield March 2, 2021*

## 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](http://www.rasc.ca/certificate-programs) for details and contact the RASC Observing Committee Chair at [rasc.ca/contact/observing](http://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](http://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 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

#### ISABEL WILLIAMSON LUNAR OBSERVING CERTIFICATE

##### Certified at 140 Objects:

*T. Tuomi, N. Jensen*

#### EXPLORE THE MOON CERTIFICATE

*T. Yaworski*

#### 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.astroleague.org/al/obsclubs/herschel/hers400.html>

Binocular List is at: [https://www.usask.ca/rasc/Chatfield\\_Binocular\\_List.pdf](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>