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

In This Issue:	

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 – To be determined during elections
Vice-President – To be determined during elections
Secretary – To be determined during elections
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**.

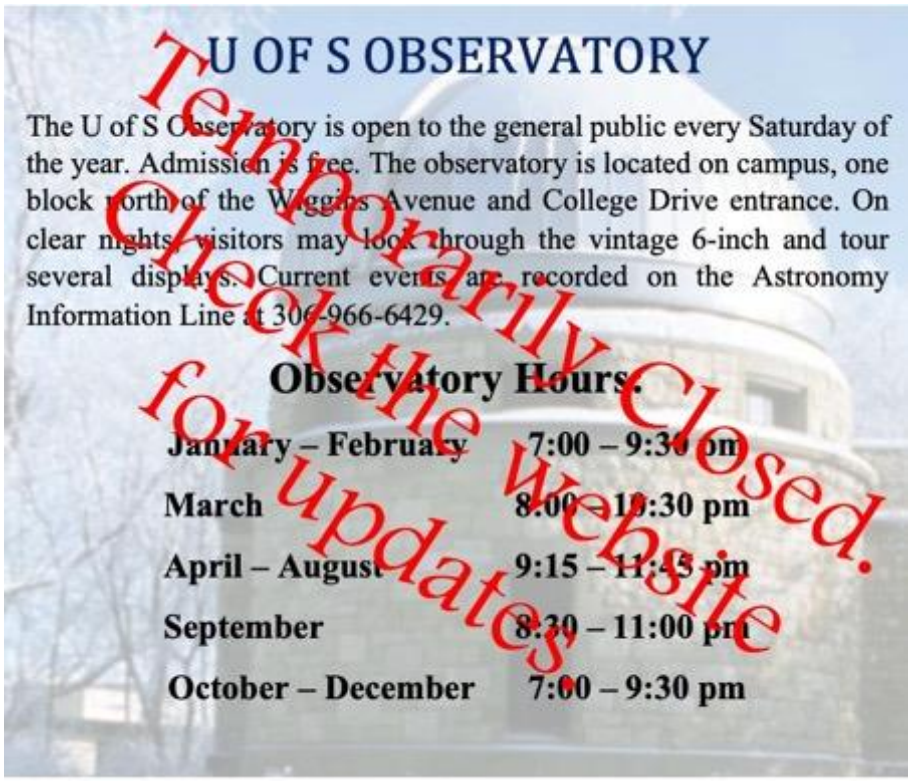
NEWSLETTER INFO

Newsletter 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@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.

Tim Yaworski presented an "Introduction to Astrophotography" workshop at the new Shakespeare on the Saskatchewan Amphitheatre along the river bank on Friday, September 25. 17 people attended the socially distant outdoor workshop. Photo by George Charpentier.



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

Facebook - **https://www.facebook.com/usaskobservatory/**

Aurora photo taken by Jeanine Holowatiuk

RASC CALENDAR OF EVENTS & MEETING INFO

Nov 14	**Observer's Group (weather permitting)**	Larry Scott
Nov 16	**RASC General Meeting - 8:00pm (info below)**	

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**

Attention all members:

We are pleased to present the following slate for voting at the online zoom meeting scheduled for Monday, November 16th at 8 PM. Please peruse the list so that you can vote for each section as presented.

We are pleased that we were able to fill most of the vacant positions and reaffirm those members who have agreed to continue on for another year.

Ron Waldron
Les Dickson
On behalf of the Nominating Committee 2020/2021

Notice to the Membership

At a meeting of the Saskatoon Centre executive held on October 19th, it was decided to change the term of president and vice president to one year terms each from the traditional two year terms. The intent is to attract more members to serve on these important positions. This change will be voted upon at the December meeting on December 14th, 2020.

Saskatoon Centre, RASC Proposed Slate of Officers for 2010 / 2021

National Executive Positions	2020-2021
President (1-yr term)	Ron Waldron
Vice-president (1-yr term)	Mike Dolan
National Council Rep.	Les Dickson
Secretary	Rick Huziak
Treasurer(s)	Norma Jensen / Donna-Lee May
Support Positions	
Librarian/Archivist	
Activities Coordinator	Tim Yaworski
Newsletter	Colin Chatfield
Web Master	Gordon Sarty
Sleaford Maintenance Coordinators	Darrell Chatfield, Rick Huziak
Sleaford Joint Site Committee	Darrell Chatfield, Les Dickson
Observers Group Coordinator	Larry Scott, Cam McLelland
Speaker Coordinator	Rick Huziak
Membership Coordinator	Mark DeJong
Telescope Rental Coordinator	Ike Thiessen
Meeting Room Coordinator	
Photographer	George Charpentier, Mike Dolan
Social Media Coordinator	Colin Chatfield, Tim Yaworski
Observing Certificate Coordinator	Darrell Chatfield

Board of Directors

Member – Les Dickson
Member – Norma Jensen
Member – Ron Waldron
Member – Tenho Tuomi

Committees

Sask Summer Star Party	Chair – Les Dickson
	Member - Les Dickson
	Member - Ellen Dickson
	Member - Greg Fusick
	Member - George Charpentier
	Member - Darrell Chatfield
	Member - Andrew Kostiuk
Light Pollution Abatement	Chair - Richard Huziak
	Member – vacant
Sleaford Joint Site	Member (RASC) - Les Dickson
	Member (RASC) - Darrell Chatfield
(U of S appoints their members)	Member (UofS) – Daryl Janzen
	Member (UofS) - Sasha Koustov
Constitution Committee	Members – Jim Gorkoff, Les Dickson

November RASC General Meeting

for all members and guests

Join us on November 16, 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 as well, but is included here:

Executive meeting (will discuss nominees):
https://us02web.zoom.us/j/83454419510

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, but is included here:

Members meeting (elections, plus Colin Chatfield talk):
https://us02web.zoom.us/j/83454419510

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.

Speaker:
- **Colin Chatfield - "Track the Sky"** A brief overview of using a tracking Mount to take night sky photos.

SPEAKERS FOR MEETINGS

Rick Huziak

On-line meetings present additional challenges for finding speakers, because potential speakers would need to have access to a computer and figure out presentation methods on programs like Zoom, Slack or Teams. After the initial challenge of installing the program on your computer, the rest is not actually too hard. Preparing a program for presentation becomes the same as doing a PowerPoint, or just talking into the camera to your audience on the computer screen.

That aside, we always need speakers for our meetings, so please think about presenting on-line during the next year, or in person, hopefully, thereafter. Topics can include anything astronomy or space related: your observing program, imaging, out-reach, a visit to another Centre or an astronomical observatory or a tour of a NASA facility, building your observatory, effects of light pollution on your efforts or just something that you are interested in telling others! Talks can be any length from 5 minutes to 40 minutes. As I usually point out, we have about 88 astronomically-interested members so I'd think we could do about 88 presentations, but it doesn't work that way, and each month we scramble to find speakers. But changes to on-line meetings have given us the opportunity to invite outside speakers to present on-line: speakers from other RASC Centres, universities and, indeed, from around the astronomical world! Although this is tempting, one danger is that we start presenting things similar to what can already be found on YouTube.

With this in mind, remaining with speakers who are within or closer to our Centre keeps the meeting more relevant to the building our Centre. Reaching out further, on occasion, allows us to expand our horizons to learn about other Centres or the National RASC. But reaching out presents another issue: Why would others agree to talk to our Centre unless we can reciprocate and provide a speaker for their Centre? So, keep in mind that if you can create a presentation for our local club, we can also leverage that talk to another club and form mutually beneficial relationships.

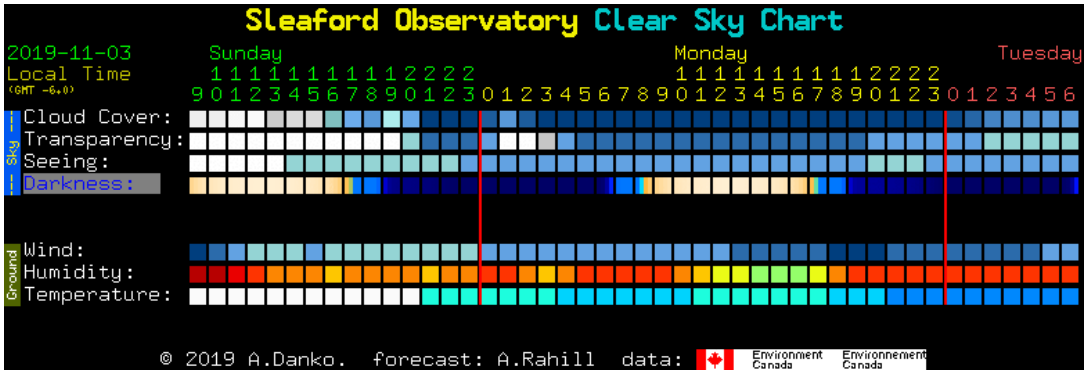
If you just can't present, then please "attend" our on-line meetings! Our actual virtual meeting attendance tends to be lower than our previous in-person meetings, even though we have the ability to reach a larger audience on-line. This seeming contradiction just emphasizes that like-minded people really prefer to meet in person and that it is important to exchange ideas that way. But until we can, stay safe, stay distant, and please think about helping out one way or another during the virtual phase of our cub meetings!

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 Abatement Committee -

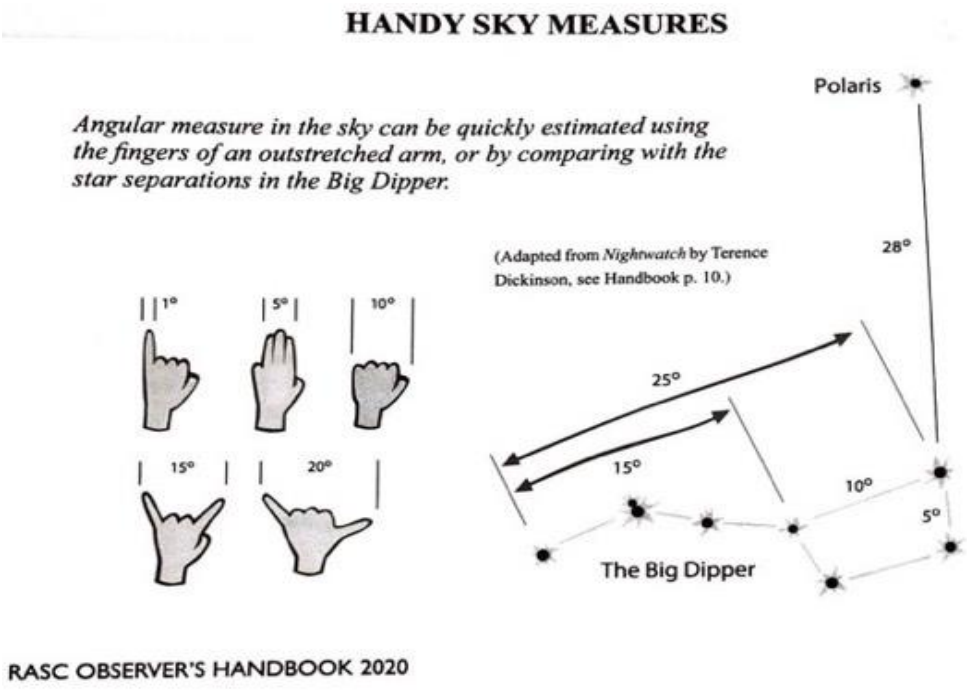
http://myotherlife.net/slpac/

www.darksky.org

Milky Way taken by Tara Magee in August 2020

NOVEMBER 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



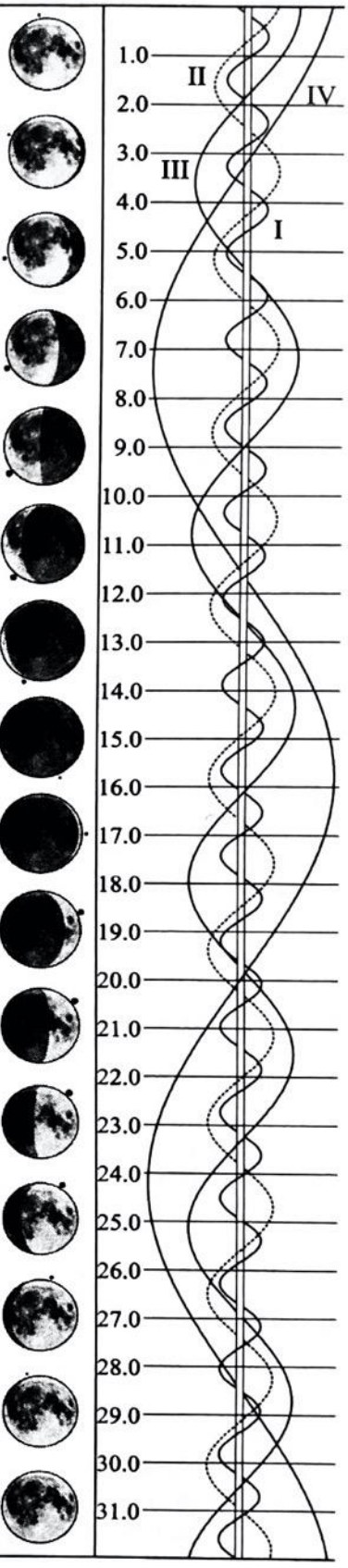
THE SKY FOR NOVEMBER

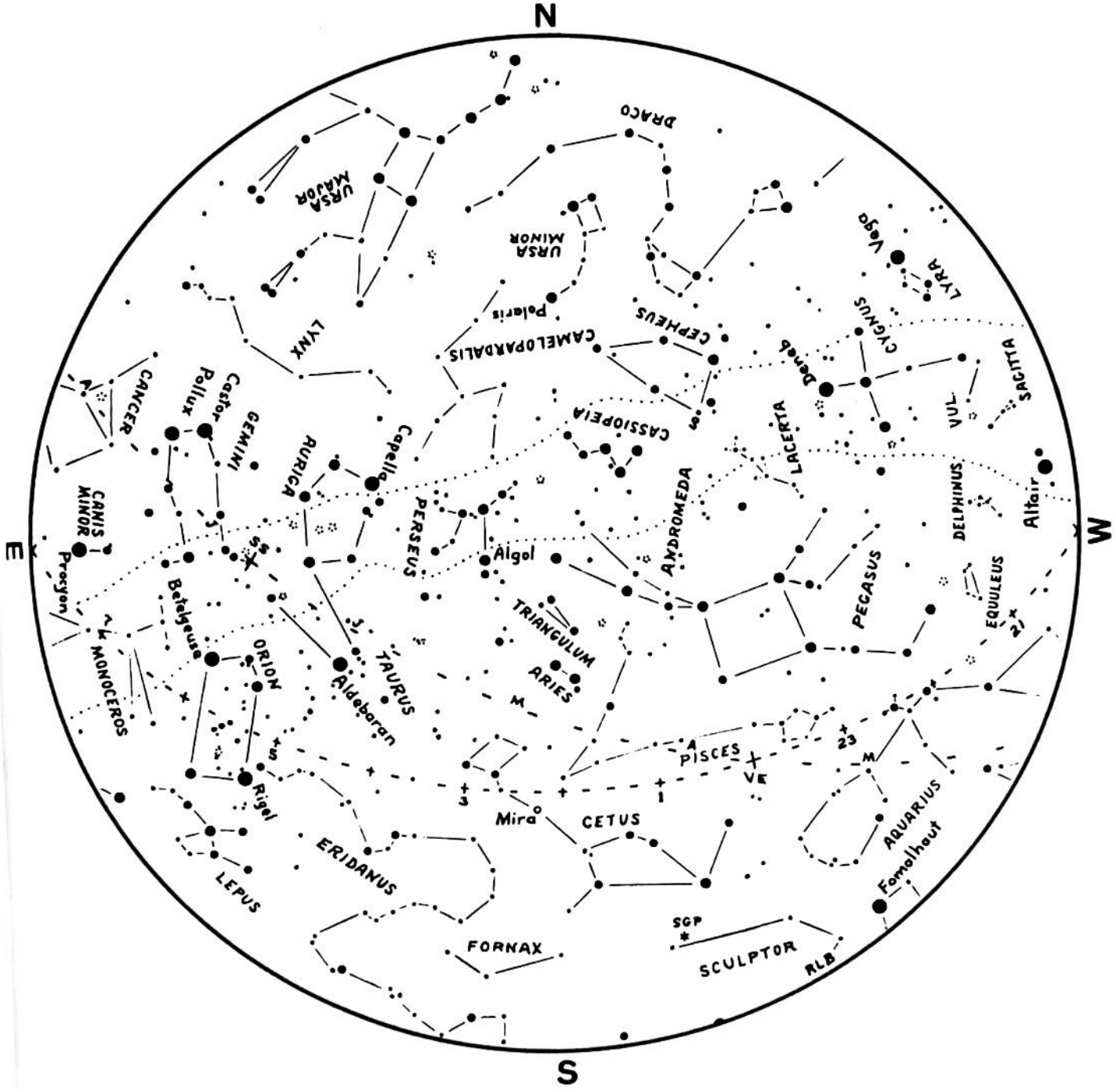
		Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Sun
RA	1	13h 39m	12h 19m	1h 02m	19h 30m	19h 52m	2h 25m	23h 18m	14h 25m
	11	13h 54m	13h 04m	0h 57m	19h 37m	19h 55m	2h 23m	23h 17m	15h 05m
	21	14h 44m	13h 50m	0h 57m	19h 44m	19h 58m	2h 22m	23h 17m	15h 46m
Dec	1	–9° 09′	–0° 19′	+4° 43′	–22° 17′	–21° 17′	+13° 51′	–5° 44′	–14° 25′
	11	–9° 16′	–4° 57′	+4° 54′	–22° 03′	–21° 11′	+13° 43′	–5° 46′	–17° 24′
	21	–14° 09′	–9° 29′	+5° 32′	–21° 46′	–21° 03′	+13° 36′	–5° 48′	–19° 54′
Dist	1	0.75	1.27	0.47	5.34	10.17	18.79	29.29	0.992
	11	1.00	1.33	0.51	5.48	10.33	18.81	29.43	0.990
	21	1.23	1.38	0.57	5.61	10.48	18.85	29.59	0.988
Mag	1	1.6	–4.0	–2.1	–2.2	0.6	5.7	7.8	
	11	–0.6	–3.9	–1.8	–2.1	0.6	5.7	7.9	
	21	–0.7	–3.9	–1.5	–2.1	0.6	5.7	7.9	
Size	1	9.0″	13.1″	20.1″	36.9″	16.4″	3.7″	2.3″	32′ 14″
	11	6.7″	12.6″	18.2″	36.0″	16.1″	3.7″	2.3″	32′ 19″
	21	5.5″	12.1″	16.3″	35.1″	15.9″	3.7″	2.3″	32′ 23″

Moon: On November 0 at 0h UT*, Sun's selenographic longitude is 82.90° and increases 12.2° each day thereafter.
Greatest N declination on the 6th (+24.8°)
Greatest S declination on the 18th (–24.7°)
Libration in longitude: E limb most exposed on the 20th (+7.5°)
W limb most exposed on the 8th (–7.4°)
Libration in latitude: N limb most exposed on the 24th (+6.8°)
S limb most exposed on the 11th (–6.7°)
Large tides in the days following new Moon (Nov. 15).
Penumbral lunar eclipse on Nov. 30, visible from northwestern Europe, South America, North America, Australia, Asia, the North Atlantic Ocean, and the Pacific Ocean.
Mercury: Emerges in the morning sky early in the month, achieving its greatest elongation west (GEW) on the 10th, just 19° from the Sun at mag. –0.6. Geometry is favourable for Northern Hemisphere observers. Mercury continues to brighten in the days that follow but loses altitude against the horizon as well as separation from the Sun. Can still be seen with difficulty in bright twilight near the end of the month.
Venus: Continues to be prominent among the stars of Virgo, passing 4° N of Spica on 15th. The waning crescent Moon joins the scene on the 12–13, passing 3° N of Venus. By mid-month, the receding second planet will have faded to mag. –3.9, half of its brilliance at Greatest Illuminated Extent in late April and mid-July.
Mars: Visible in the east and southeast as darkness falls, Mars will ride high in the sky for most of the night. It achieves its second stationary point on the 15th, some 13° to the west of its first stopping point and 67 days later. In the second half of the month, it gradually resumes prograde motion through the stars of eastern Pisces. As it recedes from both Earth and Sun, Mars fades by a full magnitude in November, from mag. –2.1 on the 1st to mag. –1.1 on the 30th, while its diameter diminishes from 20 to 15″. The waxing gibbous Moon scrolls by 5° to the south on the 24–25th. Meridian transit times at Greenwich on the 1st, 11th, 21st—22:16, 21:32, 20:53 UT*.
Jupiter: Low in the southwest in early evening for Northern Hemisphere observers. The gap between Jupiter and Saturn closes from 5° on the 1st to just over 2° at month end. The waxing crescent Moon joins the scene on the 18–19.
Saturn: Low in the SW sky in early evening for Northern Hemisphere observers, the gap between Saturn and Jupiter closes from 5° to 2.25° during the month. The waxing crescent Moon passes south of both on the 18–19.
Uranus: Now past opposition, it is well placed rising in the eastern sky at the onset of darkness and remains visible most of the night in southern Aries. Meridian transit times at Greenwich on the 1st, 11th, 21st—23:39, 22:58, 22:17 UT*.
Neptune: Well placed in the evening sky among the stars of Aquarius. Reaches its second stationary point on the 29th and gradually resumes prograde motion thereafter. Meridian transit times at Greenwich on the 1st, 11th, 21st—20:33, 19:53, 19:13 UT*.
*See p. 94, the bold-faced sentences of the first paragraph.

NOVEMBER EVENTS

Time (UT) d	h	m	
Sun. 1			**DAYLIGHT SAVING TIME ENDS**
	19	01	Algol at minimum
Mon. 2			Mercury at perihelion
Tue. 3	8		Mercury stationary
Wed. 4	15	50	Algol at minimum
Thu. 5	2		**Moon 0.2° N of M35**
	18		S. Taurid meteors peak
Fri. 6			
Sat. 7	12	39	Algol at minimum
Sun. 8	9		Juno in conjunction with the Sun
	13	46	**Last quarter**
Mon. 9			
Tue. 10	9	28	Algol at minimum
	17		**Mercury greatest elongation W (19°)**
Wed. 11			
Thu. 12			Mercury at greatest heliocentric lat. N
	17		N. Taurid meteors peak
	21		**Venus 3° S of Moon**
Fri. 13	6	17	Algol at minimum
	21		**Mercury 1.7° S of Moon**
Sat. 14	12		Moon at perigee (357837 km) **Large tides**
Sun. 15	5	07	**New Moon** (lunation 1211)
	19		Mars stationary
Mon. 16	3	06	Algol at minimum
Tue. 17	23		Leonid meteors peak
Wed. 18	23	55	Algol at minimum
Thu. 19	9		**Jupiter 2° N of Moon**
	15		Saturn 3° N of Moon
Fri. 20			
Sat. 21			Venus at greatest heliocentric lat. N
	20	44	Algol at minimum
Sun. 22	4	45	**First quarter**
Mon. 23			
Tue. 24	17	33	Algol at minimum
Wed. 25	20		Mars 5° N of Moon
Thu. 26			
Fri. 27	0		Moon at apogee (405 894 km)
	14	22	Algol at minimum
	17		Uranus 3° N of Moon
Sat. 28			
Sun. 29	9		Neptune stationary
Mon. 30	9	30	**Full Moon**
			Penumbal Lunar Eclipse (p. 130)
	11	11	Algol at minimum




N
E
W
S
DRACO
URSA MAJOR
URSA MINOR
Vega
LYRA
Polaris
LYNX
CEPHEUS
CAMELOPARDALIS
Deneb
CYGNUS
CANCER
Pollux
Castor
GEMINI
CASSIOPEIA
LACERTA
VUL
SAGITTA
AURIGA
Capella
CANIS MINOR
Procyon
PERSEUS
Algol
ANDROMEDA
DELPHINUS
Altair
Betelgeuse
TRIANGULUM
PEGASUS
EQUULEUS
MONOCEROS
ORION
Aldebaran
TAURUS
ARIES
PISCES
VE
Rigel
Mira
CETUS
AQUARIUS
Fomalhaut
LEPUS
ERIDANUS
SGP
FORNAX
SCULPTOR
RLB

MINUTES OF OCTOBER MEETING

Rina Rast

Minutes of the Executive Meeting, October 19, 2020

Attendees: Tim Yaworski, Rina Rast, Les Dickson, Daryl Janzen, Darrell Chatfield, Donna-Lee May, Mike de Jong, Ron Waldron, Grant Ursaki, Rick Huziak, Scott Rosendahl, Colin Chatfield, Tim Yaworski

Meeting called to order by Daryl Janzen at 7:06 PM.

Motion to adopt agenda by Les Dickson, seconded by Rina Rast, passed as all in favour.

Reports:

Snow blowing/lawn-mowing at Sleaford:

We will need a new volunteer to mow lawns and blow snow at Sleaford for next year.

Filling new positions:

It was agreed to find descriptions for each position that needs to be filled for the upcoming year.

Ron Waldron proposed switching president/vice president positions to 1-year terms. This may be a bylaw change; in which case the membership will need 30 days' notice before a vote is made. This will be looked in to, and if necessary, announced in November so that it is voted in during the December meeting.

Nominating committee: Les Dickson and Ron Waldron are forming a nominating committee to find volunteers for the Executive. The general election will be held this month and will continue in November.

Call to adjourn at 8:00 PM by Ron Waldron and seconded by Les Dickson, passed as all in favour.

Minutes of the General Meeting, October 19, 2020

Meeting called to order 8:10 PM by Daryl Janzen.

Motion to adopt Meeting Minutes published in the October 2020 newsletter, passed as all in favour.

Elections today: openings for president, vice president, and secretary. Les Dickson is willing to fill the position as National Council Representative, and our current treasurer Norma Jensen is willing to continue in that role as well. These Les and Norma were unanimously voted in to continue in their positions.

Ron Waldron and Les Dickson are forming a committee to fill the three remaining Executive positions.

Colin Chatfield will advertise for Executive positions on social media. Colin is also willing to continue as Social Media Coordinator and Newsletter Coordinator.

It was suggested to find a volunteer chairperson to run each meeting until a new president is found. Mike Rooney will be the chairperson for the November meeting.

Presentation: "Chasing the Northern Lights" by Ron Waldron.

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

"As winter skies approach Orion slowly dominates the sky. This was shot with a Fujifilm X-T10 camera with a William Optics 61mm refractor mounted in a Skywatcher Star Adventurer mount. This early attempt at the Running Man and Orion Nebulas from December 2018 has motivated Tim Yaworski to work harder each year to improve on this image. Perhaps this is the year it happens."

HACKING YOUR CANON & OBSERVING MARS

Tenho Tuomi

In the October 2017 Journal, under Binary Universe: Hacking your Canon P&S, Blake Nancarrow mentioned software called Magic Lantern which adds many features to Canon EOS cameras. It is based on the CHDK software which he wrote about for point-and-shoot cameras. I downloaded Magic Lantern for my Canon EOS Rebel T5i/700D and it was very easy to install. Now I have about 100 new menu features plus an opportunity to write my own scripts if that isn't enough. All I was interested in were the Intervalometer and Bulb timer. Now after using a homemade timer for ten years, I need only my camera to take multiple deep-sky images. It is handy to have the intervalometer built into the camera.

Before downloading, I checked my camera firmware version to see if it matched what the ML software required. It was version 1.1.1, and they required 1.1.5 so I had to update that first. The 1.1.5 update would not download from the ML site so I went to the Canon site http://www.canon.ca/en/Contact-Support/Consumer/Downloads, entered my model number and downloaded the firmware update for my camera. The zip file included instructions on how to install it onto the camera.

Then I downloaded Magic Lantern (hence called ML) software from http://magiclantern.fm/ under Downloads/Nightly builds. I selected my camera from thirteen other Canon EOS models. A warning was given, "Magic Lantern is not approved nor endorsed by Canon in any way and using it will probably void your warranty. We are not responsible for any damages to your camera."

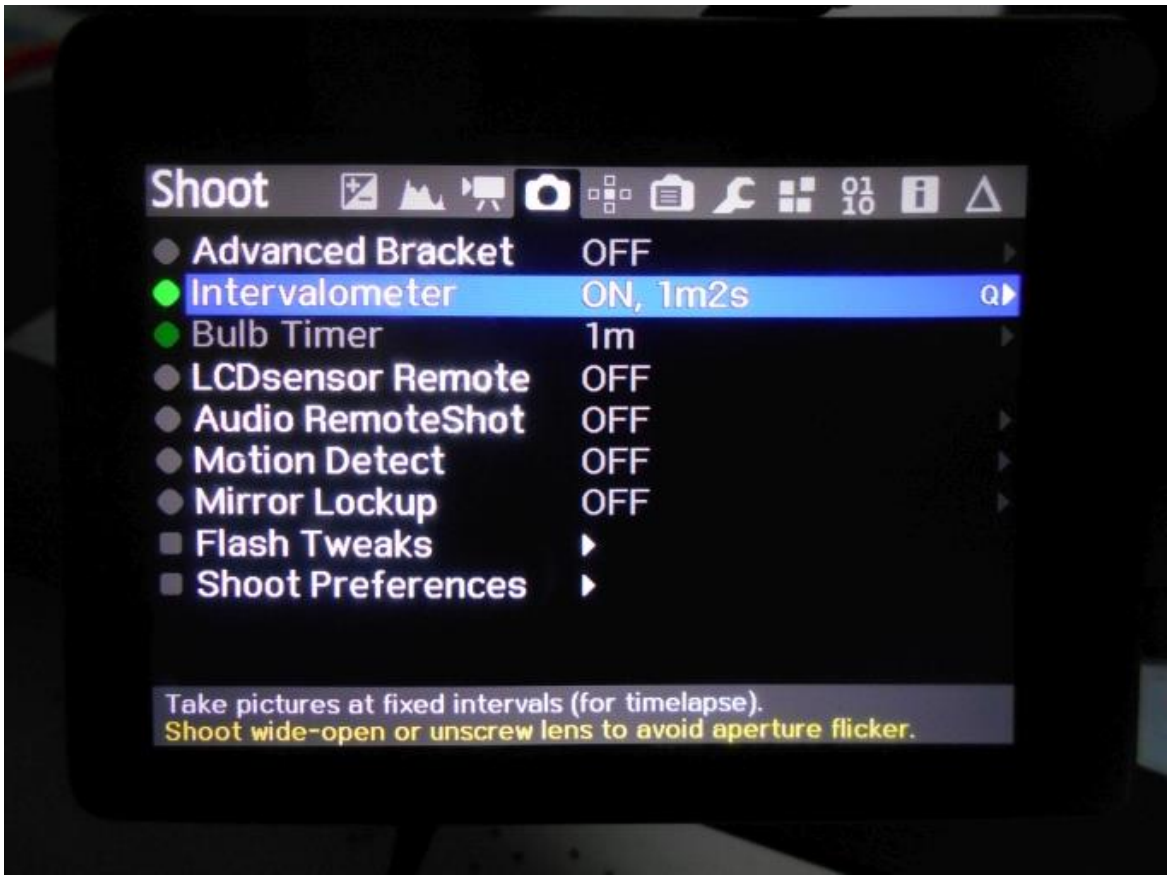
There were brief install instructions on the download page. For more detailed instructions I went back to the Home page and looked at Docs / Install Guide. The software came in the form of a zip file which had a readme file with more dire warnings. The zip file contents are simply copied to the root directory of the SD card. The in-camera user guide was missing in my installation, but the full user guide is found on the ML home page under Docs/User Guide.

For using this software, I have two SD cards, one for normal use and the other for using ML. To install ML, I used the update firmware command again on the ML card and that made the camera boot from a card and made the card bootable so that the camera loads ML from the card when the camera is turned on. When the card door is opened on the ML card the LED light comes on which probably means that the camera is updating the configuration on the card. They say to wait 5 seconds after opening the door before removing the ML card.

The Erase button is used as the menu button for ML. For my photography I used a homemade timer for ten years to take 20 one-minute exposures. Now I set the Bulb Timer in the ML menu to one minute and set the intervalometer to start after 4 seconds (to prevent shake) and take a picture every one minute and 4 seconds, and to stop after 20 pictures. The default is to start taking pictures as soon as you leave the ML menu by pressing the Erase (menu) key, so I don't turn the intervalometer on until I am ready to take pictures. The picture taking can be interrupted by pressing the shutter button halfway and then pressing the Erase button to turn the intervalometer off.

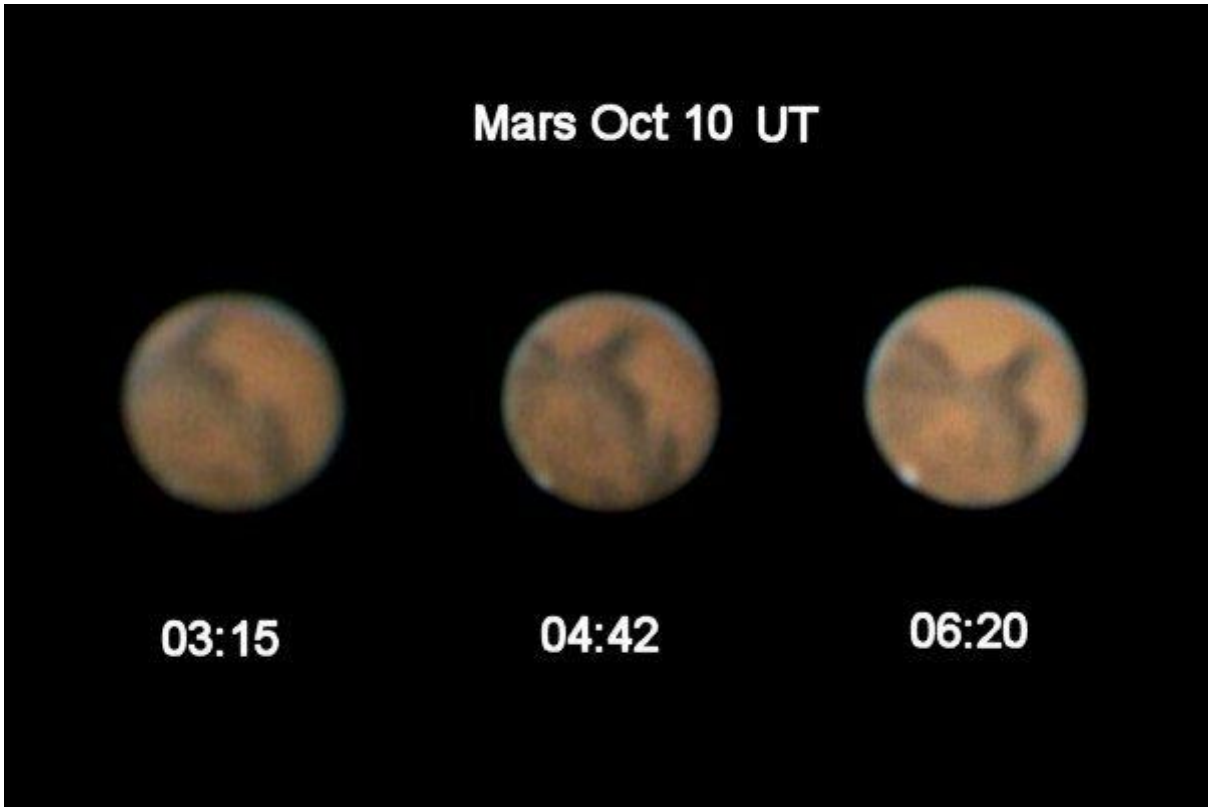
Likely when I get more familiar with this software, I will start using other features in it. I notice it did add more information to Live View. I did find one other useful feature, a red-light mode for the display which makes the display so much less glaring in the dark, though I changed it to dark green to make it readable both day and night.

Last year I bought a modified Canon T3i/600D camera and installed Magic Lantern on it with the same good results.



Observing Mars

I have been photographing Mars during its opposition. Here is a sequence from October 9 showing Mars turning over three hours. Picture taken with a Canon T5i camera on a 12" Newtonian with 10mm eyepiece projection plus a 2x teleconverter. A 47 second video was taken at 60 frames per second and ISO 1600, converted to .avi with PIPP, and stacked and enhanced in RegiStax 6. South is down. The major feature showing on Mars is Syrtis Major.



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 Schlapkohl	43
Ellen Dickson	34
Graham Hartridge	9

CHATFIELD BINOCULAR CERTIFICATE
Certified at 35 to 40 Objects:
T. Tuomi, R. Huziak

Jim Goodridge	12

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.astroloeague.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**