

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>

In This Issue:

Membership Information / Officers of the Centre	2
Newsletter Info	3
U of S Observatory / Light Abatement Info	4
Calendar of Events / Notice of Meeting / Book Drive	5
Clear Sky Chart / Weather Info / Speakers for Meetings	6
The Pleiades - Cultural Myth and Folklore	7-10
June Night Sky Events and Info / The Story of Avro Canada	10-13
Minutes of May Meeting	15
Comet Update / Sleaford Robotic Telescope Project Proposal	16-17
Books for Sale	18
Saskatchewan Summer Star Party / Observing Clubs and Certificates	19-20

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

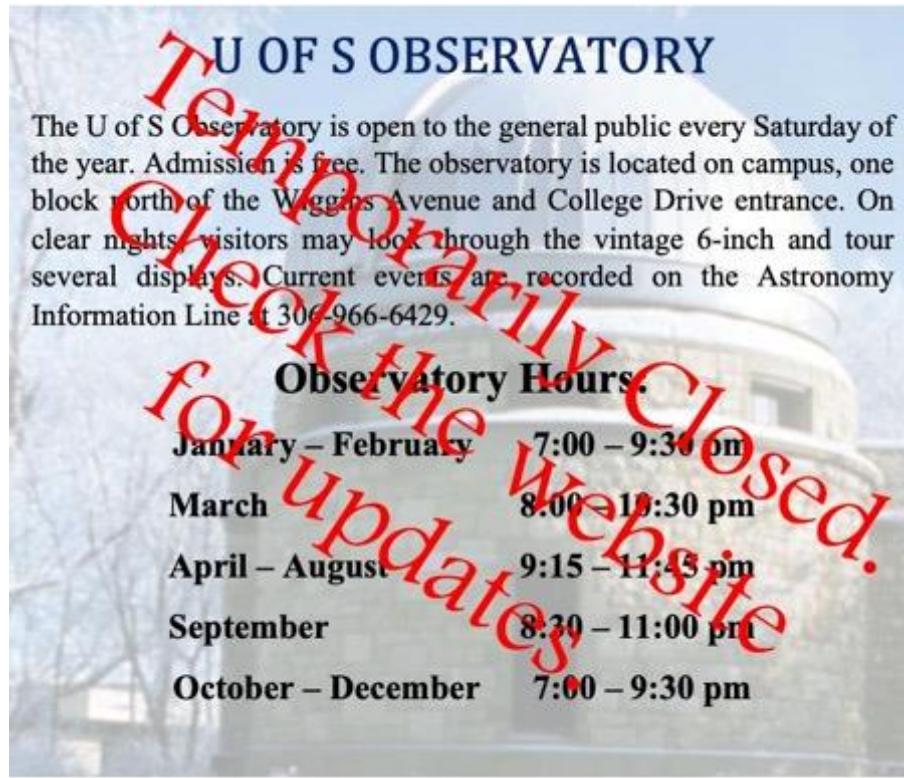
Newsletter Editor – Colin Chatfield
Copy & Collate – Les & Ellen Dickson
Labels & Temps – Mark de Jong
Web Posting – Gord Sarty

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.



M51 taken by Rina Rast and Brennan Rodgers



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

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



Saskatchewan Light Abatement Committee -

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



www.darksky.org

RASC CALENDAR OF EVENTS

June 15	RASC General Meeting - 8:00pm	Daryl Janzen
June 20	Observer's Group (weather permitting)	Larry Scott

June RASC General Meeting for all members and guests

Join us on June 15, 2020 at 8:00PM
Webinar (info below)

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

A Zoom registration link 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: a link to register to attend the webinar will be emailed out, 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.

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

BOOK DRIVE

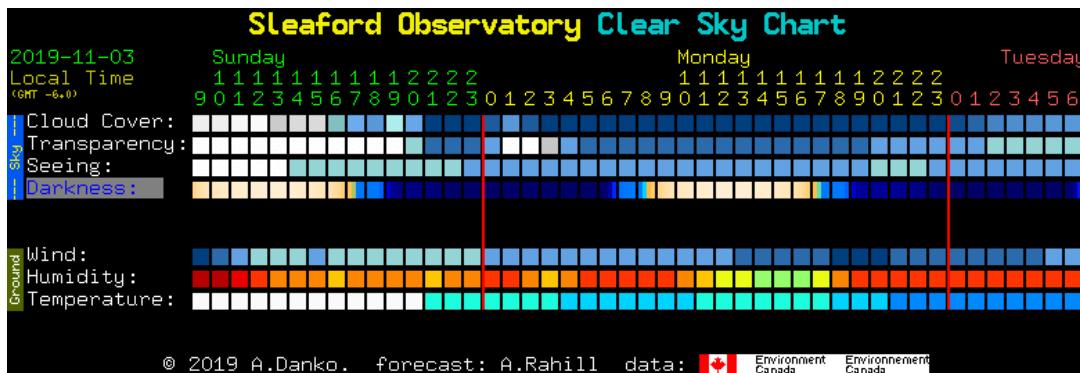
Astronomy-related book donations are being accepted to the RASC Saskatoon Centre Library at the U of S Observatory during its regular Saturday evening open house, April - August 9:15-11:45pm (please note that the observatory is currently closed indefinitely due to COVID-19).

CLEAR SKY AND WEATHER INFO

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

<https://www.cleardarksy.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

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. Daryl Janzen will talk about U of S telescopes, and then possibly 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.

THE PLEIADES - CULTURAL MYTH AND FOLKLORE

An Essay by Mike Dolan - "The Unorthodox Astronomer"

I was watching “Ancient Aliens” on TV one evening and the discussion focused on The Pleiades, also known as the Seven Sisters or Messier 45, and how other cultures have explained its existence. The melding of many cultures and beliefs has developed a vast array of folklore and storytelling to explain nature and the heavens. It seems that humans need to have a reason, some kind of logic, or an explanation for why “that” is what “that” is. I thought it would be fun to research and explore some of the myths and legends of M45 and I composed this essay after a few hours of reading and research and, since it was found on the Internet, it must be true!

I was born and raised in Hawaii and learned to respect and embrace the beliefs and traditions of the many different cultures and backgrounds that were present in the Islands. From the early Polynesian sailors to Captain Cook to the many other peoples that immigrated to the islands, they all brought their own culture and folklore. In ancient Hawaii there was a festival known as Makahiki. The Makahiki season was celebrated when Makali'i or “little eyes”, what the Hawaiians called The Pleiades, would be visible in the island skies. During Makahiki season manual labor was forbidden or “kapu” as was warfare and the days were spent resting and feasting. During the Makahiki season from approximately October to February, all effort was given to assure that nothing would adversely affect the new crops. Today the Aloha Festivals, originally called Aloha Week, are held to celebrate the Makahiki tradition.

The Pleiades are a prominent sight in the Northern Hemisphere during the winter months and are easily visible with the naked eye. M45 has been known to many cultures around the world, including the Celts, the Māori who call them Matariki, Aboriginal Australians, the Persians who called them Parvīn, the Arabs who called them Thurayya, the Chinese who called them the Quechua, the Japanese, the Maya, the Aztec, the Sioux, the Kiowa, and the Cherokee. In Hinduism, the Pleiades are known as Krittika and are associated with the war-god Kartikeya. They are also mentioned three times in the Bible. This essay will discuss some of the many cultures of the world and show that although this amazing star cluster has many names it seems to be basically the same to all.

Tuareg Berbers of the northern Sahara call the Pleiades "daughters of the night". To other Berbers it is Tagemmunt "the group". A paraphrased Berber proverb states, “When the Pleiades fall the hot, dry summer is coming. When they rise the cold rainy season is coming”.

In the Old Testament, the Pleiades are mentioned in Amos 5:8 and Job 9:9 and Job 38:31. The first two are references about their creation. The third is where the Lord is speaking directly to Job and challenges him, to bind the chains of the Pleiades — the implication being that Job can't, but the Lord can.

According to Jewish folklore, when two fallen angels named Azazel and Shemhazai made it to the earth, they fell strongly in love with the human women. Shemhazai found a maiden named Istehar who swore she would give herself to him if he told her the sacred name which granted him the power to fly to Heaven. When he told her, she flew up to Heaven, never to fulfill her promise, thus she was placed in the star cluster Pleiades for breaking her promise.

In Greek mythology, the Pleiades were the seven daughters of Atlas, a Titan who held up the sky and the sea nymph Pleione, protectress of sailing. The sisters were Maia, Electra, Alcyone, Taygete, Asterope, Celaeno and Merope. The Pleiades were sometimes said to be nymphs in the train of Artemis. To the Vikings, the Pleiades were Freyja's hens, Hungarians compared them to a hen with chicks. In contemporary Danish culture the cluster is known as Syvstjernen, the Seven Stars. In Western astrology they represent coping with sorrow and were considered one of the medieval fixed stars.

In a small group of astrology beliefs the seven solar systems revolve around Pleiades. The Celts associated the Pleiades with mourning and with funerals, since at that time in history the autumn equinox and the winter solstice were festivals devoted to the remembrance of the dead like Halloween or All Saints Day.

In Ukrainian folklore the Pleiades refer to the female tribal deities. According to the legend, seven maids lived long ago. They used to dance the traditional round dances and sing the glorious songs to honor the gods. After their death the gods turned them into water nymphs, and, having taken them to the Heavens, settled them upon the seven stars, where they dance their round dances to this day.

The ancient Aztecs based their calendar on the Pleiades. Their year began with the Pleiades, rising in the east, appearing just before dawn.

Blackfoot legend says the Pleiades are orphans, "Lost Boys" that were not cared for by the people, so they became stars. Because the buffalo are not available while the "Lost Boys" are in the skies, the Pleiades were a signal for the Blackfoot people to travel to their winter hunting grounds to conduct the large-scale hunts. These hunts generally ended in great buffalo jumps that are well known in first nation cultures.

A Cherokee myth indicates that seven boys, who would not do their chores and only wanted to play, ran around and around the ceremonial court in a circle, and rose up into the sky. Only six of the boys made it to the sky but the seventh was caught by his mother and fell

to the ground with such force that he sank into the ground. A pine tree grew over his resting place.

The Kiowa legend of the Seven Star Girls links the origin of the Pleiades to Devils Tower in Wyoming. The seven little girls were chased by bears, and climbed a low rock. They begged the rock to save them, and it grew higher and higher until they were pushed up into the sky. The seven girls became the Pleiades and the grooves on Devils Tower are the marks of the bear's claws.

In Indonesia the Pleiades marks the arrival of the "mangsa kapitu" or "seventh season", which starts the beginning of rice planting season. In the Philippines the Pleiades are known as "Moroporo", meaning either "the boiling lights" or "a flock of birds" (depending on the dialect) which starts a new agricultural season, and the preparation for the planting crops.

In Japan, the Pleiades are known as "Subaru" which translates to "coming together" or "cluster" in the Japanese language. A large car manufacturer incorporates six stars to represent the five companies that merged into one as its corporate logo. The Subaru Telescope, located at the Mauna Kea Observatory in Hawaii, is also named after the famous star cluster.

A legend from south-eastern Australia has it that they are the fire of seven sisters. These women were the first to know fire-making and each carried live coals on the end of their digging sticks. They refused to share these coals with anybody and were ultimately tricked into giving up their secret by a wise man, which brought fire to mankind. After this, they were swept into the night sky. Their glowing fire sticks became the bright stars of the Pleiades cluster.

In Swahili the Pleiades are called "kilimia" meaning "dig" or "cultivate" as their visibility was taken as a sign to prepare digging as the onset of the rain was near. Like many South African cultures, the Pleiades is associated with agriculture and plenty.

And finally, my favorite, in Ufology some believers describe Nordic alien extraterrestrials called Pleiadeans as originating from this system. In New Age lore, some believe that the Sun and the Earth will pass through a Photon belt from the Pleiades, causing a cataclysm and initiate a spiritual transition or a "shift in consciousness", the "Great Shift" of the Ages". Barbara Marciniak, author of *Bringers of the Dawn*, is one of the authors who contributes to the New Age myths of Pleiadian ET beings who are linked to human ancestry.



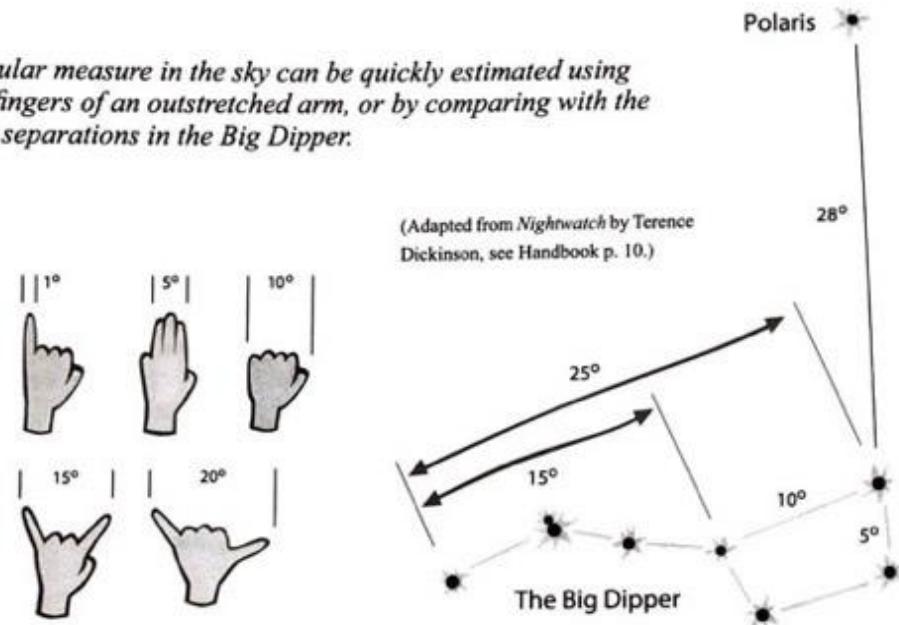
Regardless of your beliefs or your cultural background the Pleiades is always a stunning star cluster and one that inspires the imagination. I know I have enjoyed many an evening observing and studying M45. I can't prove it, but, I may have even seen ET wave at me from behind one of those stars.

Many sources and many hours of reading and research were used to write this article – too many to list. I just needed to mention that!

JUNE 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



THE SKY FOR JUNE

		Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Sun
RA	1	6h 17m	4h 54m	22h 59m	19h 54m	20h 14m	2h 24m	23h 27m	4h 36m
	11	6h 55m	4h 30m	23h 24m	19h 51m	20h 13m	2h 26m	23h 27m	5h 18m
	21	7h 01m	4h 16m	23h 48m	19h 47m	20h 11m	2h 28m	23h 27m	5h 59m
Dec	1	+25° 21'	+23° 43'	-9° 06'	-21° 04'	-20° 01'	+13° 51'	-4° 43'	+22° 03'
	11	+23° 15'	+20° 37'	-6° 47'	-21° 13'	-20° 07'	+14° 00'	-4° 41'	+23° 05'
	21	+20° 32'	+18° 13'	-4° 29'	-21° 25'	-20° 15'	+14° 08'	-4° 41'	+23° 26'
Dist	1	0.89	0.29	1.01	4.41	9.34	20.65	30.09	1.014
	11	0.71	0.30	0.94	4.31	9.22	20.55	29.92	1.015
	21	0.59	0.33	0.88	4.23	9.13	20.43	29.75	1.016
Mag	1	0.1	—	-0.0	-2.6	0.4	5.9	7.9	
	11	1.1	-4.0	-0.2	-2.6	0.4	5.9	7.9	
	21	3.0	-4.5	-0.3	-2.7	0.3	5.9	7.9	
Size	1	7.5"	57.6"	9.3"	44.7"	17.8"	3.4"	2.2"	31' 33"
	11	9.4"	56.2"	9.9"	45.7"	18.0"	3.4"	2.2"	31' 30"
	21	11.3"	50.2"	10.6"	46.6"	18.2"	3.4"	2.3"	31' 28"

Moon: On June 0 at 0h UT*, Sun's selenographic longitude is 15.08° and increases 12.2° each day thereafter.

Greatest N declination on the 22nd (+24.1°)

Greatest S declination on the 8th (-24.0°)

Libration in longitude: E limb most exposed on the 9th (+5.9°)

W limb most exposed on the 22nd (-5.1°)

Libration in latitude: N limb most exposed on the 14th (+6.9°)

S limb most exposed on the 1st (-6.7°) and 28th (-6.8°)

Penumbral lunar eclipse on Jun. 5, visible from Australia, Antarctica, Asia, Africa, Europe, eastern South America, the Indian Ocean, the south Atlantic Ocean, and the western Pacific Ocean.

Annular solar eclipse on Jun. 21, visible from Africa, eastern Europe, Asia, extreme northern Australia, the Indian Ocean, and the Pacific Ocean.

Mercury: Achieves greatest eastern elongation (GEE) on the 4th when it is 24° removed from the Sun at mag. +0.4, and will be well placed, though fading, in the evening sky for Northern Hemisphere observers until about mid-month.

Venus: Reaches inferior conjunction on the 3rd, when it grazes just past the Sun only 0.2° from its limb. This is an analogue of the Transits of Venus of 2004 Jun. 8 and 2012 Jun. 6, but it results in a very near miss this time. Venus quickly scoots into the morning sky, where it can be observed by mid-month, rapidly gaining separation to the west of the Sun. Its retrograde motion ends on the 24th, when it reaches its second stationary point, after which it resumes prograde motion from west to east against the background stars. It will have a close approach to the Moon on the morning of the 19th, when an occultation can be seen in morning twilight in Atlantic Canada.

Mars: Becoming ever more prominent in the morning sky, it brightens from magnitude 0.0 to -0.5 during June, passing from Aquarius into Pisces late in the month. It is sandwiched between Neptune and the third-quarter Moon on the 12–13.

Jupiter: Now rising before midnight local daylight time as it approaches its Jul. 14 opposition. In retrograde motion throughout the month, it will appear to crawl westward against the stars of northwestern Sagittarius. In quasi-conjunction with Saturn throughout the month, with the waning gibbous Moon joining the scene on the 8–9. Meridian transit times at Greenwich on the 1st, 11th, 21st—03:15, 02:33, 01:50 UT*.

Saturn: In retrograde motion throughout the month, tracking slowly westward against the stars of western Capricornus. During the month, it starts to rise before midnight local daylight time. The Moon passes 3° to its south on the June 8–9. Meridian transit times at Greenwich on the 1st, 11th, 21st—03:35, 02:54, 02:13 UT*.

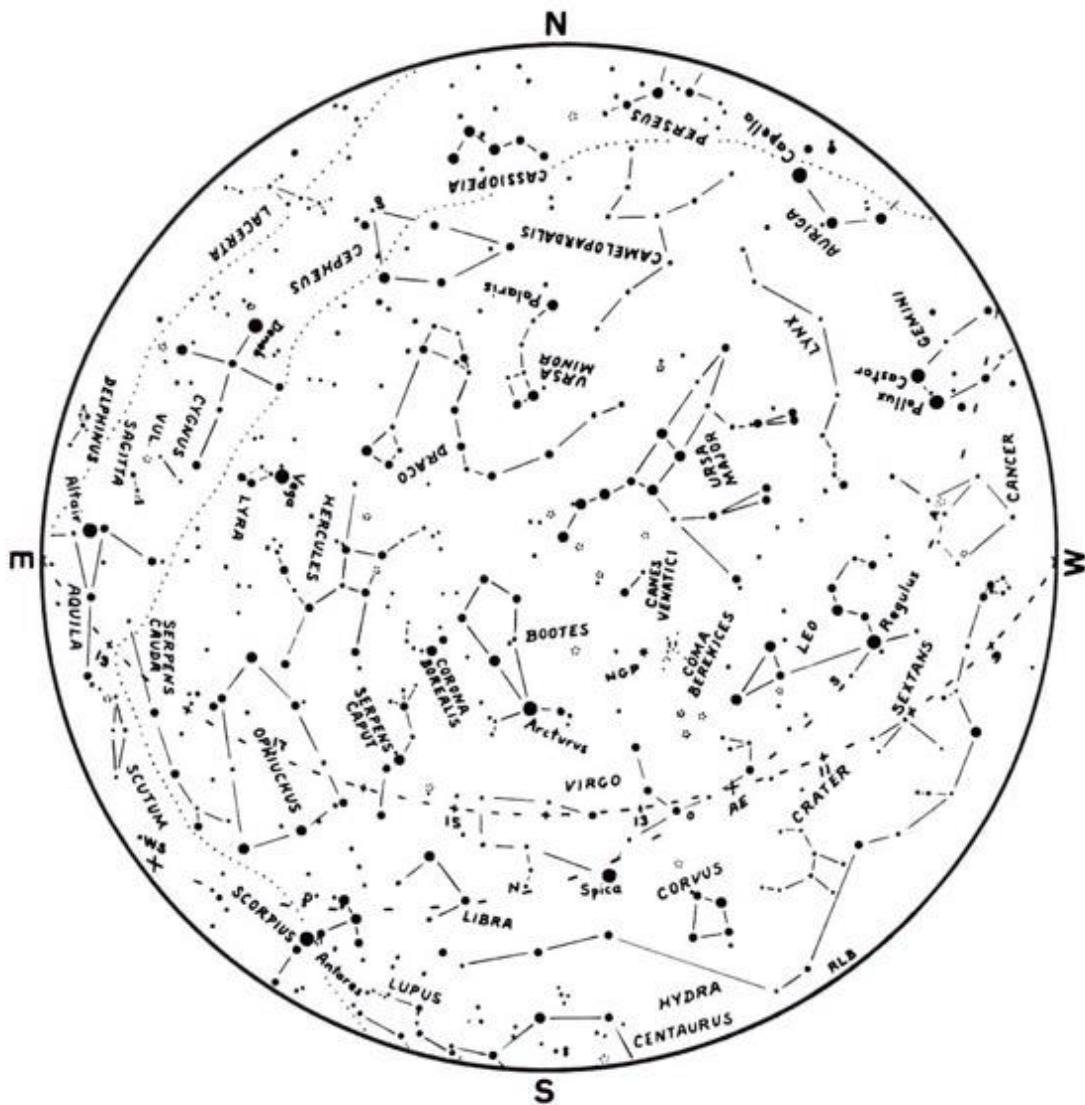
Uranus: Beginning to emerge in morning twilight, though the Sun's high declination makes it a tough find for Northern Hemisphere observers.

Neptune: In the morning sky among the late rising stars of Aquarius.

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

Time (UT)				JUNE EVENTS	Jupiter's Satellites	
	d	h	m		West	East
Mon.	1					
Tue.	2	19	44	Algol at minimum		1.0
Wed.	3	4		Moon at perigee (364 366 km)		2.0
		18		Venus in inferior conjunction		3.0
Thu.	4	11	21	Double shadow transit on Jupiter		4.0
		13		Mercury greatest elongation E (24°)		IV
Fri.	5			Venus at descending node		
		16	33	Algol at minimum		
		19	12	Full Moon		
				Penumbral Lunar Eclipse (p. 127)		
Sat.	6					
Sun.	7					
Mon.	8	13	22	Algol at minimum		
		17		Jupiter 2° N of Moon		
Tue.	9	2		Saturn 3° N of Moon		
Wed.	10					
Thu.	11	10	11	Algol at minimum		
		14	33	Double shadow transit on Jupiter		
Fri.	12			Mercury at descending node		
		12		Mars 1.7° S of Neptune		
Sat.	13	0		Mars 3° N of Moon		
		6	24	Last quarter		
Sun.	14	7	00	Algol at minimum		
Mon.	15	1		Moon at apogee (404 595 km)		
Tue.	16					
Wed.	17	2		Uranus 4° N of Moon		
		3	49	Algol at minimum		
		20		Mercury stationary		
Thu.	18	18	33	Double shadow transit on Jupiter		
Fri.	19	9		Venus 0.7° S of Moon, occultation†		
Sat.	20	0	38	Algol at minimum		
		21	44	Solstice		
Sun.	21	6	41	New Moon (lunation 1206)		
				Annular Solar Eclipse (p. 127)		
Mon.	22	21	27	Algol at minimum		
Tue.	23			Mercury at aphelion		
		18		Neptune stationary		
Wed.	24	18		Venus stationary		
Thu.	25	18	16	Algol at minimum		
Fri.	26					
Sat.	27					
Sun.	28	8	16	First quarter		
		15	05	Algol at minimum		
Mon.	29					
Tue.	30	2		Moon at perigee (368 958 km)		

†Azores, Canary Is., N & E Canada, Greenland, NW half of Europe, N & C Russia, N Mongolia



TOUCH THE SKY: THE STORY OF AVRO CANADA

This exhibit is closed temporarily, but I'll leave the info in case it opens again.

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>



Aurora and Milky Way from Sleaford Observatory on May 25 by Tim Yaworski



A flyby of the International Space Station as it flew over Saskatoon on the evening of May 21. Tim Yaworski posted this image on social media and that led to an online conversation between him and Russian cosmonaut Anatoly Ivanishin, a current crew member of the ISS.

MINUTES OF MAY MEETING

Rina Rast

Minutes of the Executive Meeting, May 25, 2020

Attendees: Daryl Janzen, Les Dickson, Ron Waldron, Jim Gorkoff, Rina Rast, Jim Goodridge, Patricia Gakis, Mark DeJong, Tim Yaworski, Grant Ursaki, Darrel Chatfield

Meeting called to order by Daryl Janzen at 6:06 PM.

Motion to accept agenda, by Ron seconded by Les, passed as all in favour.

Reports:

SSSP Update by Les Dickson

SSSP has been cancelled for this summer due to COVID-19 (decision was unanimous).

Some guest speakers for this year are showing interest in returning for next year.

T-shirts and pins will be offered for sale online, updates will be posted to the website.

Sleaford Robotic Telescope(s)

Presentation on the current set-up of PROMPT-USASK by Daryl Janzen.

Discussion on future use for the Meade-16 and the possibility of the club buying a robotic mount with USASK supplying the camera and filter wheel.

Motion by Les Dickson, seconded by Darrel Chatfield to create a business plan which will be presented at the June meeting, at which time a decision will be made. Motion passed as all in favour.

Motion to adjourn at 7:03, passed as all were in favour.

Minutes of the Meeting, May 25, 2020

Presentation by Phil Groff, RASC Executive Director.

Report on the cancellation of SSSP 2020.

Further discussion on modifying the Meade-16 to make use of it as a robotic telescope.

COMET UPDATE

Tenho Tuomi (Photos by Tenho)

C2017T2-M81-M82_18.jpg. Comet C/2017 T2 (PANSTARRS) passing galaxies M81/M82 on May 22. Picture taken through an 80mm telescope, north is to the right.



C2020F8_60.jpg. Comet C/2020 F8 (SWAN) taken May 23 through an 80mm telescope, picture cropped to 1/4 size. My 6th new comet for this year. This was a bright comet seen from the southern hemisphere but was fading by the time it made an appearance at my latitude a few degrees above the horizon.



SLEAFORD ROBOTIC TELESCOPE PROJECT PROPOSAL

Daryl Janzen

The Centre is considering installing a robotic telescope in the U of S roll-off observatory at Sleaford, which would be accessible to all members and included with membership dues. A sub-committee was struck at the May meeting, to assess feasibility and interest in the project—you should have received a survey invitation in your email inbox on June 6! Results of the subcommittee's assessment will be presented for discussion at the June meeting.

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



Taken near Hudson Bay by Jeanine Holowatuik. 14mm / iso 3200 / 15 seconds/f2.8

SASKATCHEWAN SUMMER STAR PARTY 2020

Planning Update - Les Dickson



Due to the pandemic, we felt it was prudent to cancel SSSP 2020. The decision was based on two major issues:

- 1) the threat to the health of attendees and the possibility of spreading infection to a large number of people, and
- 2) the restrictions on the size of public gatherings and social distancing meant that all of the day-time programming would have to be cancelled. We will be planning to hold the next SSSP from August 4th to 9th, 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 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-	94
Goldkuhle	
Wade Selvig	75
Wayne Schlakohl	43
Ellen Dickson	34
Graham Hartridge	9

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

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

EXPLORE the UNIVERSE

Certified at 55 to 110

Objects: *T. Tuomi,*

Wayne Schlakohl	55
Jim Goodridge	35

HERSCHEL 400-II CLUB

Darrell Chatfield	400
Tenho Tuomi	378
Rick Huziak	246

Chatfield BINOCULAR

CERTIFICATE

Certified at 35 to 40 Objects:

T. Tuomi, R. Huziak

Jim Goodridge	12
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Isabel Williamson Lunar

Observing Certificate

Certified at 140 Objects:

T. Tuomi, N. Jensen

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>