NOVA
NEWSLETTER OF THE VANCOUVER CENTRE RASC
VOLUME 2023 | ISSUE 3 | MAY JUNE 2023

Space Medicine on the Moon, Mars and Beyond

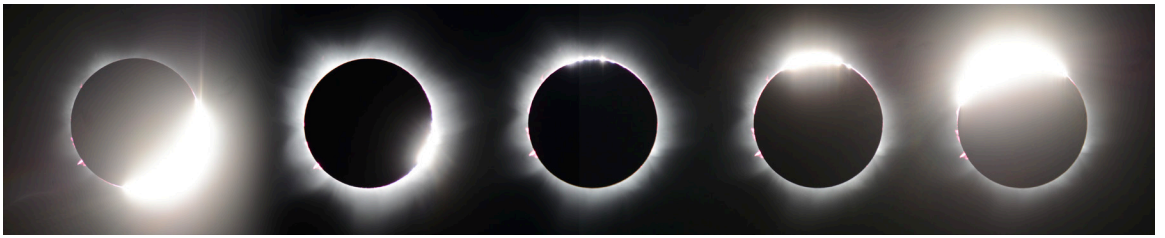
Location: Diamond Family Auditorium 300, SFU Burnaby Campus

Speaker: Dr. Shawna Pandya – Canadian physician and scientist-astronaut candidate

Bio: Dr. Shawna Pandya is a physician, aquanaut, scientist-astronaut candidate with the International Institute for Astronautical Sciences (IIAS), skydiver, pilot-in-training, VP Immersive Medicine with Luxsonic Technologies, Medical advisor at Orbital Assembly Corporation, and Fellow of the Explorers Club. She is Director of IIAS' Space Medicine Group, Chief Instructor for IIAS' Operational Space Medicine course, a host with the World Extreme Medicine's podcast series, Primary Investigator for the Shad Canada-Blue Origin student microgravity competition, member of the AIAA ASCEND Guiding Coalition, Life Sciences Team Lead for the Association of Spaceflight Professionals, and sessional lecturer for "Technology and the Future of Medicine," at the University of Alberta.

Presentation Abstract: Microgravity. Radiation. Isolation. Let's face it—space is trying to kill us. So what does it really take to send people to LEO, the Moon, Mars and beyond, and more importantly, how do we go from surviving...to thriving? In this engaging and informative talk, Dr. Shawna Pandya talks about the medical and health challenges we face as we send humans to increasingly distant and ambitious locales in space, the technologies that will get us there, and the less-often discussed aspects of human spaceflight—like how not to get voted off the Habitat, the challenges of reproduction in spaceflight, and what we are learning from emerging research on the International Space Station. Dr. Pandya ends by discussing future-looking concepts in space medicine, such as building permanent medical capabilities off-Earth, the science fiction technologies that will need to become reality in order to get us there...and the plan for a MedEvac from Mars (hint: it needs some work). ✸

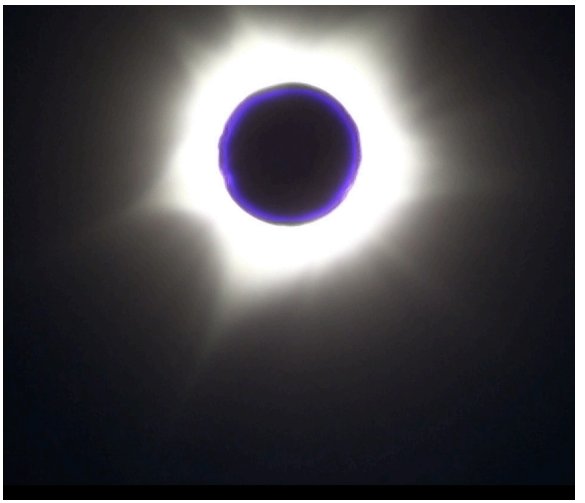
MAY 11 SFU	JUNE 8 SFU	JULY 13 SFU
Dr. Shawna Pandya, Canadian scientist and astronaut candidate: Space Medicine on the Moon, Mars and Beyond. Details above and on Meetup.	Speaker TBA. Watch Meetup for updates and room location.	Speaker TBA. Watch Meetup for updates and room location.



Total Solar Eclipse

by Antonio Massa & Oleg Mazurenko

Oleg and his friend Antonio travelled to Learmonth (Exmouth) in Western Australia for the April 20, 2023 total solar eclipse. Oleg's image, a frame from a video stream, is on the right and some of Antonio's images are above.The first two images from the lower strip of images were taken as the eclipse approached totality. The large image at the top is of totality and clearly shows some bright pink flares and prominences above the Sun's surface, mainly seen on the left side of the disk. The diffuse glow around the Sun is the corona, its hot, outer atmosphere. The last three images in the middle strip were taken as the Sun emerged from behind the Moon and the total eclipse came to an end.



President's Message

by Alan Jones

Greetings Members and Guests!

May 11, 2023 we host Dr. Shawna Pandya who will speak to us about staying healthy in space, more specifically medicine on the moon. Dr. Pandya and her talk are described in this newsletter elsewhere. I can add that we are fortunate to have a group of dedicated members serving on our council continuously finding and hosting interesting speakers and events for our membership and the public. We are also grateful to Dr. Pandya and Simon Fraser University Physics Department that have generously contributed to this event.

As our weather improves, the nights get shorter and we get busier. May 13 is Astronomy Day for our club which we celebrate in conjunction with SFU Science Rendezvous on SFU's Burnaby Mountain Campus. This daytime event will, weather permitting, include solar view-

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About RASC

The RASC Vancouver Centre meets at 7:30 PM on the second Thursday of every month at SFU's Burnaby campus (see map on page 4). Guests are always welcome. In addition, the Centre has an observing site where star parties are regularly scheduled.

Membership is currently $104.00 per year ($61.10 for persons under 21 years of age; family memberships also available) and can be obtained online, at a meeting, or by writing to the Treasurer at the address below. Annual membership includes the invaluable Observer's Handbook, six issues of the RASC Journal, and, of course, access to all of the club events and projects.

For more information regarding the Centre and its activities, please contact our P.R. Director.

NOVA, the newsletter of the Vancouver Centre, RASC, is published on odd-numbered months. Opinions expressed herein are not necessarily those of the Vancouver Centre.

Material on any aspect of astronomy should be e-mailed to the editor or mailed to the address below.

Remember, you are always welcome to attend meetings of Council, held on the first Thursday of every month at 7:30pm in the Trottier Studio in the Chemistry wing of the Shrum Science Centre at SFU. Please contact a council member for directions.

2023 Vancouver Centre Officers

President	Alan Jones president@rasc-vancouver.com
Vice-President	Robert Conrad vp@rasc-vancouver.com
Secretary	Suzanna Nagy secretary@rasc-vancouver.com
Treasurer	Phil Lobo treasurer@rasc-vancouver.com
National Rep.	Nolan Smith national@rasc-vancouver.com
Librarian	William Fearon library@rasc-vancouver.com
Public Relations	Andrew Ferreira publicrelations@rasc-vancouver.com
LPA	Leigh Cummings lpa@rasc-vancouver.com
Dir. of Telescopes	Rick Schneider telescopes@rasc-vancouver.com
Observing	Robert Conrad observing@rasc-vancouver.com
Membership	Marla Daskis membership@rasc-vancouver.com
Events Coordinator	Vacant events@rasc-vancouver.com
Education	Robert Conrad, Andrew Krysa education@rasc-vancouver.com
VRO	Carl Bandura observatory@rasc-vancouver.com
Merchandise	Kyle Dally merchandise@rasc-vancouver.com
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NOVA Editor, Past President	Gordon Farrell novaeditor@rasc-vancouver.com
Speakers	Andrew Ferreira speakers@rasc-vancouver.com
Imaging	Rob Lyons imaging@rasc-vancouver.com
At Large	Shay Pomeroy, Michael Levy, Milan B
Honourary President	J. Karl Miller

Library

The centre has a large library of books, magazines and old NOVAs for your enjoyment. Please take advantage of this club service and visit often to check out the new purchases. Suggestions for future library acquisitions are appreciated.

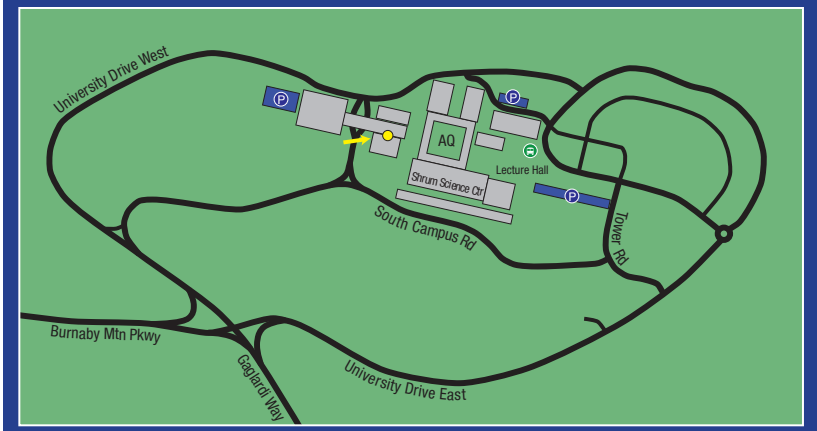
On the Internet

rasc-vancouver.com
astronomy.meetup.com/131/
www.facebook.com/RASC.Van
www.instagram.com/rascvancouver/
@RASCVancouver

Mailing Address

RASC Vancouver Centre
PO Box 89608
9000 University High Street
Burnaby, B.C.
V5A 4Y0

Map to Meeting Site



Our May meeting is in the Gordon and Leslie Diamond Family Auditorium, located on the south side of the Convocation Mall, as indicated by the arrow on the map.

Pay parking is available at several locations located around campus (indicated as "P" on the map).

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ing. Almost 30 member-volunteers will support our club's portion of hosting this event. Come and meet other enthusiastic astronomy members at the event. Enjoy SFU Science Department's displays as well.

On our regular meeting nights, the second Thursdays of the month, we open the Trottier observatory for members to borrow telescopes and books from our club library. When the weather is clear, we will do observing with the 0.7 meter telescope. Our partnering agreement with SFU includes access for our membership to the Trottier observatory.

We also have a group of members interested in Astrophotography that operate the Trottier observatory on our assigned nights to collect data for later processing into images. We also have an observatory north of Maple Ridge where we have space for members to do observing and astrophotography.

Looking ahead, we will be at the Canada Day celebrations on July 1 in Maple Ridge and in Aldergrove for the Perseid meteor showers on August 12 with Metro Vancouver Parks and Environment. In the meantime, we will bring our telescopes to SFU's Clear Friday Starry Nights at the Trottier Observatory.

Our council and speakers chair are continually looking for interesting speakers for our monthly member meetings. Send us your speaker presentation suggestions to me or any council member. Our RASC-Vancouver emails are listed in the newsletter and are also on our website.

As an amateur astronomy club, we aim to support our members' interest in many aspects of astronomy, physics and space exploration. We are a charity and our regular presentations are open for public benefit with the goal to inspire interest in astronomy and science. Membership allows access to borrow telescopes, books and after training, access to use the club's telescope equipment. Our members volunteer many hours of their time to share views of the skies with the general public.

The public is welcome to join our club and support our club. Anyone, member or not, can make a donation to support us. Larger donations can be provided a tax receipt. The easiest way to join is through the National RASC website and be sure to associate your membership to Vancouver. Our RASC-Vancouver.com website includes a link which allows donations which will issue you a tax receipt. You can also make a donation through the RASC National site and designate the donation to Vancouver Centre.

Clear Skies and enjoy the coming warmer weather. Alan Jones, President, 2023 president@RASC-Vancouver.com. ✸

Two Events – One Location
International Astronomy Day & Science Rendesvous

by Suzanna Nagy

Saturday, May 13, 2023
11 am to 3:30 pm
SFU Burnaby campus
Free Parking, East Lot

It is with great enthusiasm that your Council for RASC Vancouver can announce that we will be celebrating International Astronomy Day once again in-person.

Although International Astronomy Day (IAD) actually falls on Saturday, April 29, as in years past, we will be jointly celebrating IAD and SFU's Science Rendezvous on Saturday, May 13. Mark the date on your calendar!

This joint event will be held at the SFU Burnaby Mountain Campus in the South and East Hallways of the Academic Quadrangle. For reference, this is just down the stairs from the Trottier Observatory.

This event is open to all ages and admission is free. Free parking will also be provided for the day in the East Lot nearest the bus loop. Your RASC Vancouver will be celebrating International Astronomy Day by hosting children's activities, solar telescopes, the Jim Bernath meteorite and space memorabilia collections, Ted Stroman's Moon/Apollo Mission collection, and more.

Your RASC Vancouver will also be having two free youth door prizes of telescopes donated by Telescopes Canada and by our own Council member, Phil Lobo. Get your door prize ticket at the Membership Table in the Astronomy Day section of the Academic Quadrangle.

SFU's celebration of Science Rendezvous will include interactive table exhibits, displays, and two Magic Chemistry shows. Go to SFU's website for information: www.sciencerendezvous.ca/event_sites/simon-fraser-university/

Registration for those two Magic Chemistry shows is required but free. Reserve your seats early! Register here: www.eventbrite.ca/e/science-rendezvous-and-international-astronomy-day-tickets-559778130457

Please keep an eye on our website and Meetup page for more information as we get closer to the date. We are looking forward to seeing our entire membership there as well as the public-at-large to join us in celebrating International Astronomy Day 2023. ✸

Membership has its Privileges!

Are you tired of looking at the same objects again and again (planets, moon, etc.)? Is your telescope collecting dust because it's hard to locate deep sky objects? Would you like to bring your observing to a stellar level? Robert Conrad, our observing director, leads the Vancouver RASC observing group and invites you to join by sending him an email at observing@rasc-vancouver.com. Some of the benefits of belonging to this group include:

- Hands on training on how to operate the SFU Trottier observatory
- Weekly observing sessions at the observatory or at dark sky locations
- One-one-one coaching on how to locate thousands of objects in the night sky
- Attend small interactive seminars delivered by Robert on a range of topics including failsafe star-hopping, charting challenging objects and understanding the motions of the cosmos
- Learn to make your telescope dance by locating objects such as asteroids, nova, and supernovae
- Spectroscopy and imaging training from Howard Trottier and an opportunity to collaborate on observatory research projects
- Updates on observable sky events happening during the week like asteroid/comet/deep sky conjunctions
- Access to observing guides and lists that Robert created that took hundreds of hours to create and will help with planning observing sessions
- Knowledge and expertise from other observing group members
- Learn how to quickly and efficiently find and star-hop to deep sky objects using a range of binoculars and telescopes

Upcoming Events

May
13 – Astronomy Day at SFU

July
1 – Canada Day in Maple Ridge

August
12 – Perseid Meteor Shower at Aldergrove Park
12 - 20 – Mt. Kobau Star Party

December
14 – AGM

Midnight Daystar

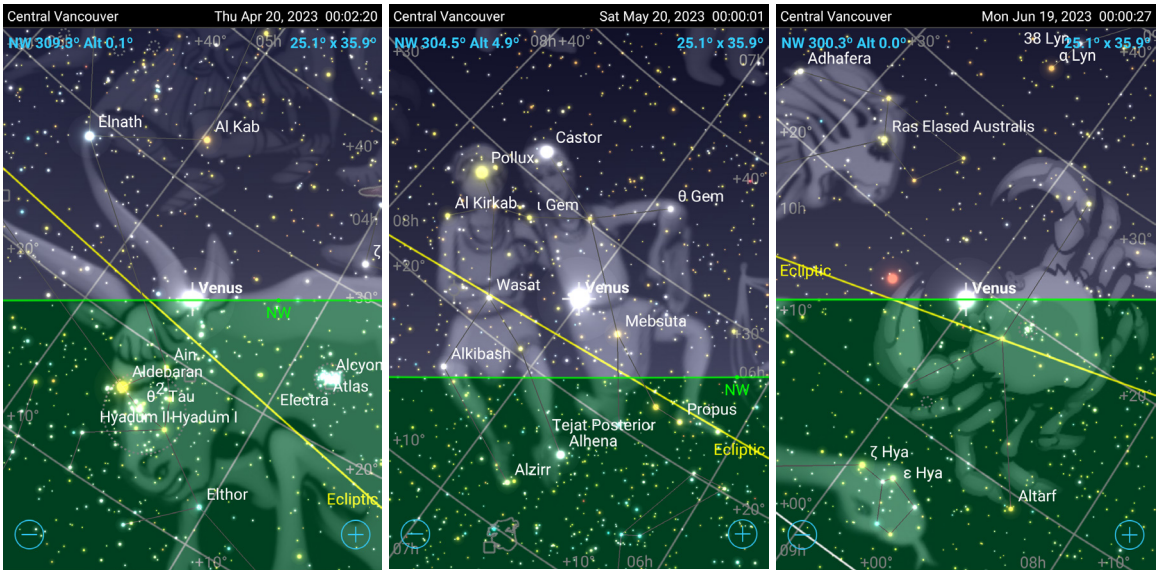
by Milan B.

Every 19 months or so, Venus, our neighbouring sister planet, passes between us and the Sun as it takes over the slower-moving Earth on its travel around our local star. Several months before and after these events called Inferior Conjunctions (ICs), Venus becomes a dazzling object in the morning or the evening sky.

As our lives are usually not centred around astronomical noon but instead much later in the day, the evening apparitions of Venus are more prominent to us than the morning ones. After all, for most of us it is much easier to stay up until 11 PM and enjoy an evening apparition of Venus than get up at 3 AM and enjoy a morning one.

The visibility of Venus in the evening sky is closely tied to another special position in the sky when Venus reaches Greatest Elongation East (GEE). At this time, Venus is at a maximum angular distance from the Sun, rising and setting several hours after the Sun. This usually happens about **70 days** before an IC.

The 2023 apparition of Venus is centred around the inferior conjunction which



Positions of Venus when setting after midnight: For the first time on April 20 (left), highest position in the sky at midnight on May 20 (middle), and for the last time on June 19, 2023 (right). All for observers in central Vancouver at longitude 123° West and 49.25° North. (courtesy of Milan B. and Sky Safari)

happens on **Aug. 13**. Consequently, GEE is scheduled for **June 4** and this is very exciting for northern hemisphere observers. Around this time, Venus is about 45° ahead of the Sun, still hanging high in northern skies despite passing the solstice point in **its eastwardly** motion almost a full month earlier **on May 7**.

For Venus, being far from the Sun and having high northern declination are two most important factors of good visibility in our skies and these two conditions are both in sync for most of the spring of 2023. Even the third, less important factor will favour the northern observers—Venus' ecliptic latitude as Venus will spend most of the spring north of the ecliptic, at times as far **as 2.8 degrees** above it.

This favourable celestial geometry will result in some extreme timings related to Venus for observers in mid to high northern latitudes. As an evening "star," Venus will be setting very late at night for a good part of the spring.

For observers north of 49°, Venus will set after midnight for **at least two months**, turning our daystar into a midnight daystar—how special is that? For central Vancouver, with longitude 123° W and latitude 49.25° N, Venus will set after midnight between **April 20 and June 19**. For observers west or east of this point, this period will start earlier or later in the month but will still last for about 2 months. For observers to the north, Whistler for example, Venus will be a midnight daystar for a little longer—**April 18 to June 20**.

In the middle of this great stretch, somewhere around **May 20** for observers in central Vancouver, Venus will reach the highest altitude in the sky at midnight (**5°**) and will be setting about **41 minutes past midnight**. These will be the nights of a midnight beacon lying low in the north-western skies. Keen observers may notice that this pinnacle of Venus' 2023 apparition does not coincide with the moment of GEE; this is true mostly due to the declination of our sister planet dropping increasingly faster once it has passed the solstice point and before reaching GEE.

Many observers remember the transit years of Venus like 2004 and 2012 or the near transit year of 2020. Since the two transits and the near-transit conjunction all happened in the month of June, it meant that Venus was very high in northern skies during those times. However, the GEE's for these June conjunctions were happening in late March, when the Sun had barely crossed the celestial equator.

With Venus relatively close to the Sun which was close to the ecliptic, were there any chances for a midnight daystar in those years? Luckily for us, northern observers, the Sun was climbing fast along the ecliptic in northern skies and Venus was going through wider than average GEEs of more than **47°**. The ecliptic latitude was also more pronounced, putting Venus at nearly **28° North**, as it was in early May of 2020. With so many things falling in place at the same time, these June conjunctions were also preceded by periods of Venus setting after midnight for observers at mid to high northern latitudes.

With all these extremes that the June and August series of inferior conjunctions of Venus bring to us, a question comes naturally: which one is more extreme?

June IC	August IC	Venus Sets at
2012		**12:34**
	2015	**12:40**
2020		**12:31**
	2023	**12:41**
2028		**12:29**
	2031	**12:42**

Extreme timings of Venus setting during June and August series of ICs between 2012 and 2031.

You be the judge in who is winning the battle of the midnight daystar. ✸

Again, the 3" Telescope...

by J. Karl Miller

After a recent serious family event, I finally have found some time to put a number of things into some order. Among those, I ran across a picture (on photo paper) which I had developed, from a film I had also developed, both in what was then my darkroom. In those days (in the sixties) it was possible to have a chemical darkroom in your house. Digital processing technology did not exist then. Nowadays, chemical processing is tightly

3" telescope

controlled, and what limited photography I pursue now is all of digital nature.

The image of the Moon at right was taken fairly soon after I bought a used 3" refractor in 1964. I have mentioned this telescope before, shown here above. The Moon photo is an afocal image, taken through an eyepiece attached to that telescope.

The afocal method can be used on any telescope with an eyepiece inserted for visual observation. The trick is to align and mount the camera to be used in such a way that the "optical centres" for all the lenses, both in telescope and camera involved, align precisely. For instance, anyone who has tried to use a smartphone to take a picture by holding it behind the eyepiece of a telescope pointed at the Moon, will have found out that a good, undistorted image is mostly a matter of luck. I've heard that there are smartphone-to-telescope adaptors available. Personally I haven't seen one, but they should be available at reputable telescope dealers.

Another requirement is an accurate alignment of the telescope mount with the north pole in the sky. Exposure time may vary, depending on what is being photographed. If the mount is misaligned, and the magnifying power used is high (i.e. a short-focus eyepiece), tracking errors could result in a "smeared" image.

As an aside, there is evidence of the Moon's curvature visible in the photo. You may notice that the crater Eratosthenes at the very bottom is perfectly round. That implies that we are looking straight down on it. The shape of the other craters placed successively higher, i.e. the large one in the centre (Archimedes) looks more oval. Plato, the large crater at the top, even more so, We are looking from increasing angles at them.

That shows the Moon's surface is dropping more and more away from our point of view. For anyone of average height standing on a level

The Apennines, Caucasus and Alps on the Moon (from the bottom up)

surface of the Moon, it means that the horizon is about 2.4 km away. This is also shown by the increasingly darker surface curving westward (to the left) on the Moon. The Sun rises in the east on the Moon, just as on Earth, therefore the east is the brightest area on the right.

I think that it is obvious that I like my 3". Occasionally, you may see it on these pages, again. ✸

Monthly Dark Hours for Vancouver

by Robert Conrad

Date - May 2023 (UT -7)	Sunset	Twilight ends	Twilight begins	Sunrise	Moonrise	Moonset	Hrs Dark	Moon %	Prime time
Monday, May 1, 2023	8:29 PM	10:46 PM	3:33 AM	5:49 AM	4:06 PM	4:52 AM	0:00:00	87.2	None
Tuesday, May 2, 2023	8:31 PM	10:48 PM	3:30 AM	5:48 AM	5:17 PM	5:06 AM	0:00:00	93.3	None
Wednesday, May 3, 2023	8:32 PM	10:51 PM	3:27 AM	5:46 AM	6:31 PM	5:20 AM	0:00:00	97.6	None
Thursday, May 4, 2023	8:34 PM	10:54 PM	3:24 AM	5:44 AM	7:48 PM	5:38 AM	0:00:00	97.6	None
Friday, May 5, 2023	**8:35 PM**	**10:57 PM**	**3:21 AM**	**5:43 AM**	**9:08 PM**	**6:00 AM**	**0:00:00**	**99.8**	None
Saturday, May 6, 2023	**8:37 PM**	**10:59 PM**	**3:18 AM**	**5:41 AM**	**10:31 PM**	**6:30 AM**	**0:00:00**	**99.5**	None
Sunday, May 7, 2023	8:38 PM	11:02 PM	3:15 AM	5:39 AM	11:51 PM	7:13 AM	0:49:00	96.6	11:02 PM - 11:51 PM
Monday, May 8, 2023	8:39 PM	11:05 PM	3:12 AM	5:38 AM	1:02 AM	8:12 AM	1:57:00	91.1	11:05 PM - 1:02 AM
Tuesday, May 9, 2023	8:41 PM	11:08 PM	3:09 AM	5:36 AM	1:57 AM	9:26 AM	2:49:00	83.1	11:08 PM - 1:57 AM
Wednesday, May 10, 2023	8:42 PM	11:11 PM	3:06 AM	5:35 AM	2:38 AM	10:49 AM	3:27:00	73.3	11:11 PM - 2:38 AM
Thursday, May 11, 2023	8:44 PM	11:14 PM	3:03 AM	5:33 AM	3:07 AM	10:50 AM	3:49:00	62.0	11:14 PM - 3:03 AM
Friday, May 12, 2023	**8:45 PM**	**11:17 PM**	**3:00 AM**	**5:32 AM**	**3:29 AM**	**12:15 PM**	**3:43:00**	**50.2**	**11:17 PM - 3:00 AM**
Saturday, May 13, 2023	**8:46 PM**	**11:20 PM**	**2:57 AM**	**5:31 AM**	**3:46 AM**	**1:39 PM**	**3:37:00**	**38.4**	**11:20 PM - 2:57 AM**
Sunday, May 14, 2023	8:48 PM	11:24 PM	2:54 AM	5:29 AM	4:02 AM	3:01 PM	3:30:00	27.3	11:24 PM - 2:54 AM
Monday, May 15, 2023	8:49 PM	11:27 PM	2:51 AM	5:28 AM	4:17 AM	4:20 PM	3:24:00	17.6	11:27 PM - 2:51 AM
Tuesday, May 16, 2023	8:51 PM	11:30 PM	2:47 AM	5:27 AM	4:33 AM	5:39 PM	3:17:00	9.7	11:30 PM - 2:47 AM
Wednesday, May 17, 2023	8:52 PM	11:33 PM	2:44 AM	5:25 AM	4:51 AM	6:59 PM	3:11:00	4.1	11:33 PM - 2:44 AM
Thursday, May 18, 2023	8:53 PM	11:36 PM	2:41 AM	5:24 AM	5:13 AM	8:18 PM	3:05:00	0.8	11:36 PM - 2:41 AM
Friday, May 19, 2023	**8:55 PM**	**11:40 PM**	**2:38 AM**	**5:23 AM**	**5:42 AM**	**9:36 PM**	**2:58:00**	**0.1**	**11:40 PM - 2:38 AM**
Saturday, May 20, 2023	**8:56 PM**	**11:43 PM**	**2:34 AM**	**5:22 AM**	**6:19 AM**	**10:48 PM**	**2:51:00**	**1.7**	**11:43 PM - 2:34 AM**
Sunday, May 21, 2023	**8:57 PM**	**11:47 PM**	**2:31 AM**	**5:21 AM**	**7:07 AM**	**11:52 PM**	**2:39:00**	**5.4**	**11:52 PM - 2:31 AM**
Monday, May 22, 2023	8:58 PM	11:50 PM	2:28 AM	5:20 AM	8:06 AM	12:43 AM	1:45:00	11.0	12:43 AM - 2:28 AM
Tuesday, May 23, 2023	9:00 PM	11:54 PM	2:24 AM	5:19 AM	9:11 AM	1:22 AM	1:02:00	18.0	1:22 AM - 2:24 AM
Wednesday, May 24, 2023	9:01 PM	11:57 PM	2:21 AM	5:18 AM	10:20 AM	1:51 AM	0:30:00	26.2	1:51 AM - 2:21 AM
Thursday, May 25, 2023	9:02 PM	12:01 AM	2:18 AM	5:17 AM	11:30 AM	2:13 AM	0:05:00	35.3	2:13 AM - 2:18 AM
Friday, May 26, 2023	**9:03 PM**	**12:05 AM**	**2:14 AM**	**5:16 AM**	**12:40 PM**	**2:30 AM**	**0:00:00**	**44.8**	**None**
Saturday, May 27, 2023	**9:04 PM**	**12:09 AM**	**2:10 AM**	**5:15 AM**	**12:40 PM**	**2:45 AM**	**0:00:00**	**54.6**	**None**
Sunday, May 28, 2023	9:05 PM	12:13 AM	2:07 AM	5:14 AM	1:49 PM	2:58 AM	0:00:00	64.4	None
Monday, May 29, 2023	9:07 PM	12:17 AM	2:03 AM	5:13 AM	2:58 PM	3:11 AM	0:00:00	73.8	None
Tuesday, May 30, 2023	9:08 PM	12:21 AM	1:59 AM	5:12 AM	4:10 PM	3:25 AM	0:00:00	82.4	None
Wednesday, May 31, 2023	9:09 PM	12:26 AM	1:55 AM	5:12 AM	5:24 PM	3:41 AM	0:00:00	89.8	None

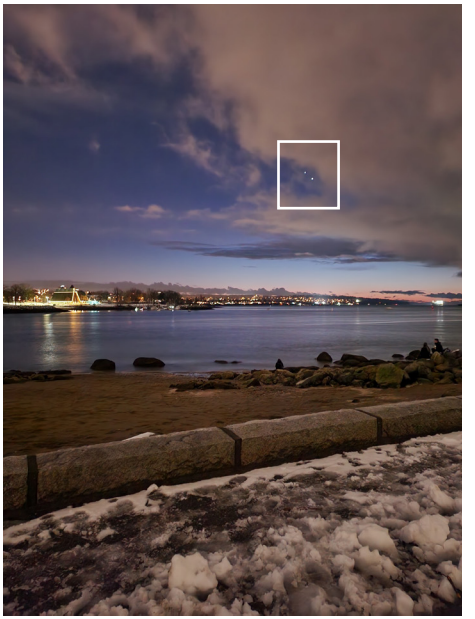
Vancouver **Total** **48:28:00**

Date - June 2023 (UT -7)	Sunset	Twilight ends	Twilight begins	Sunrise	Moonrise	Moonset	Hrs Dark	Moon %	Prime time
Thursday, June 1, 2023	9:10 PM	12:30 AM	1:50 AM	5:11 AM	6:43 PM	4:01 AM	0:00:00	95.5	None
Friday, June 2, 2023	**9:11 PM**	**12:35 AM**	**1:46 AM**	**5:10 AM**	**8:06 PM**	**4:28 AM**	**0:00:00**	**95.5**	**None**
Saturday, June 3, 2023	**9:11 PM**	**12:41 AM**	**1:40 AM**	**5:10 AM**	**9:29 PM**	**5:05 AM**	**0:00:00**	**99.0**	**None**
Sunday, June 4, 2023	9:12 PM	12:47 AM	1:34 AM	5:09 AM	10:47 PM	5:59 AM	0:00:00	99.9	None
Monday, June 5, 2023	9:13 PM	12:55 AM	1:27 AM	5:09 AM	11:50 PM	7:10 AM	0:00:00	97.8	None
Tuesday, June 6, 2023	9:14 PM	12:00 AM	12:00 AM	5:08 AM	12:37 AM	8:33 AM	0:00:00	92.8	None
Wednesday, June 7, 2023	9:15 PM	12:00 AM	12:00 AM	5:08 AM	1:10 AM	10:00 AM	0:00:00	85.2	None
Thursday, June 8, 2023	9:16 PM	12:00 AM	12:00 AM	5:08 AM	1:34 AM	11:27 AM	0:00:00	75.5	None
Friday, June 9, 2023	**9:16 PM**	12:00 AM	12:00 AM	**5:07 AM**	**1:53 AM**	**12:49 PM**	**0:00:00**	**64.4**	**None**
Saturday, June 10, 2023	**9:17 PM**	12:00 AM	12:00 AM	**5:07 AM**	**2:09 AM**	**12:50 PM**	**0:00:00**	**52.7**	**None**
Sunday, June 11, 2023	9:18 PM	12:00 AM	12:00 AM	5:07 AM	2:24 AM	2:10 PM	0:00:00	41.1	None
Monday, June 12, 2023	9:18 PM	12:00 AM	12:00 AM	5:07 AM	2:39 AM	3:28 PM	0:00:00	30.1	None
Tuesday, June 13, 2023	9:19 PM	12:00 AM	12:00 AM	5:06 AM	2:56 AM	4:45 PM	0:00:00	20.4	None
Wednesday, June 14, 2023	9:19 PM	12:00 AM	12:00 AM	5:06 AM	3:17 AM	6:03 PM	0:00:00	12.3	None
Thursday, June 15, 2023	9:20 PM	12:00 AM	12:00 AM	5:06 AM	3:42 AM	7:20 PM	0:00:00	6.1	None
Friday, June 16, 2023	**9:20 PM**	12:00 AM	12:00 AM	**5:06 AM**	**4:16 AM**	**8:34 PM**	**0:00:00**	**2.1**	**None**
Saturday, June 17, 2023	**9:21 PM**	12:00 AM	12:00 AM	**5:06 AM**	**5:00 AM**	**9:41 PM**	**0:00:00**	**0.3**	**None**
Sunday, June 18, 2023	9:21 PM	12:00 AM	12:00 AM	5:06 AM	5:55 AM	10:36 PM	0:00:00	0.6	None
Monday, June 19, 2023	9:21 PM	12:00 AM	12:00 AM	5:07 AM	6:58 AM	11:19 PM	0:00:00	3.0	None
Tuesday, June 20, 2023	9:22 PM	12:00 AM	12:00 AM	5:07 AM	8:07 AM	11:52 PM	0:00:00	7.3	None
Wednesday, June 21, 2023	9:22 PM	12:00 AM	12:00 AM	5:07 AM	9:16 AM	12:16 AM	0:00:00	13.1	None
Thursday, June 22, 2023	9:22 PM	12:00 AM	12:00 AM	5:07 AM	10:26 AM	12:35 AM	0:00:00	20.4	None
Friday, June 23, 2023	**9:22 PM**	12:00 AM	12:00 AM	**5:08 AM**	**11:34 AM**	**12:50 AM**	**0:00:00**	**28.7**	**None**
Saturday, June 24, 2023	**9:22 PM**	12:00 AM	12:00 AM	**5:08 AM**	**12:43 PM**	**1:04 AM**	**0:00:00**	**37.9**	**None**
Sunday, June 25, 2023	9:22 PM	12:00 AM	12:00 AM	5:08 AM	12:42 PM	1:17 AM	0:00:00	47.7	None
Monday, June 26, 2023	9:22 PM	12:00 AM	12:00 AM	5:09 AM	1:51 PM	1:30 AM	0:00:00	57.8	None
Tuesday, June 27, 2023	9:22 PM	12:00 AM	12:00 AM	5:09 AM	3:03 PM	1:44 AM	0:00:00	67.9	None
Wednesday, June 28, 2023	9:22 PM	12:00 AM	12:00 AM	5:10 AM	4:18 PM	2:02 AM	0:00:00	77.4	None
Thursday, June 29, 2023	9:22 PM	12:00 AM	12:00 AM	5:10 AM	5:38 PM	2:25 AM	0:00:00	86.0	None
Friday, June 30, 2023	**9:22 PM**	12:00 AM	12:00 AM	**5:11 AM**	**7:01 PM**	**2:57 AM**	**0:00:00**	**93.0**	**None**

Vancouver **Total** **0:00:00**

NGC 1514 by Phil Lobo

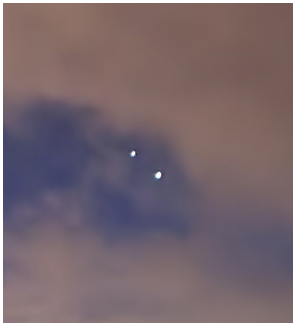
NGC 1514 (aka the Crystal Ball Nebula) is a planetary nebula in Taurus, sightly north of the Pleiades. It was discovered by William Herschel in 1790. It is twice the size of the Ring Nebula but 2 magnitudes fainter. The RASC Observer's Handbook describes it as a "faint glow around 9.4 mag central star." The nebula is challenging to observe and is easier with a nebular filter. It is thought the shape of the nebula might be due to a binary star at the centre.



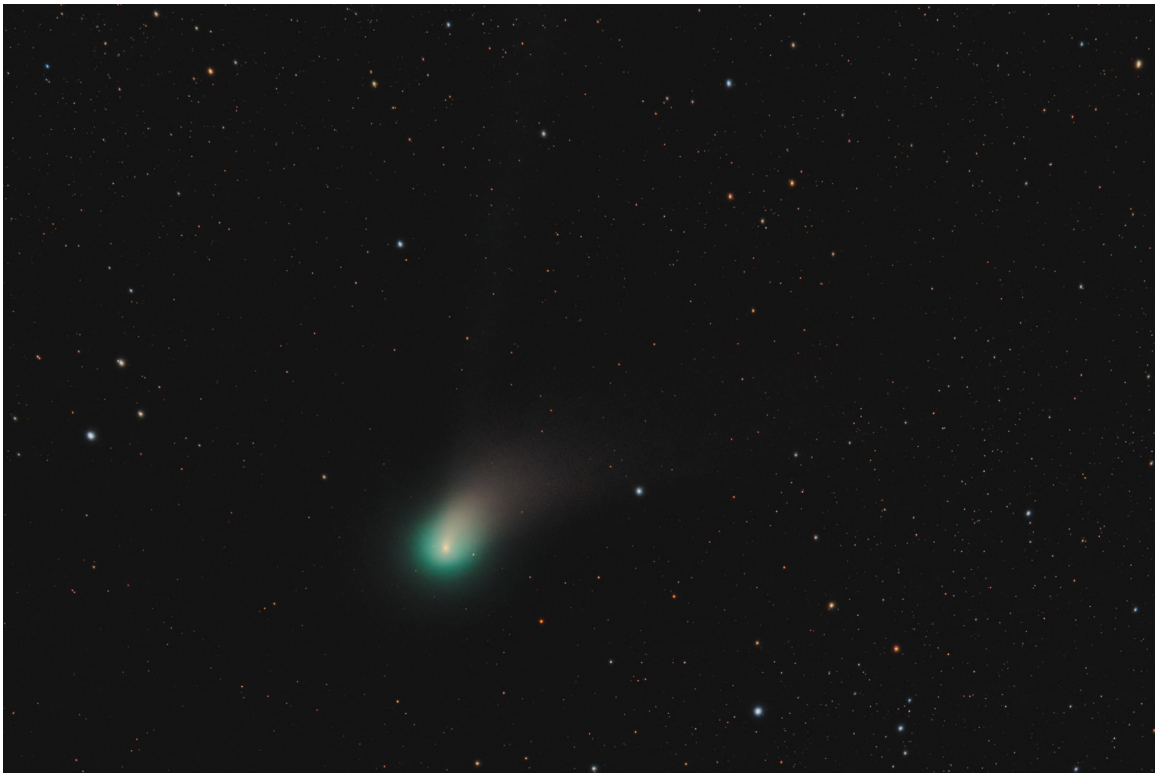
Jupiter and Venus

by Elena Popovici

A picture of the conjunction of Jupiter (upper left) and Venus (lower right) earlier this year. Taken on the evening of Feb. 28 with a Samsung smartphone.



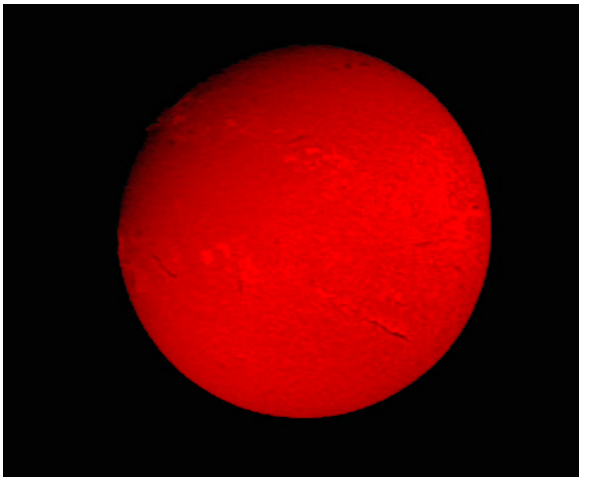
Members' Gallery



Comet C/2022 E3 (ZTF) by Mark Germani

I've never attempted a comet before; they haven't been especially well-placed in the sky since I started astrophotography a few years back, and I've only recently started using a GOTO mount. But I really wanted to give this one a go. Poor weather prevented it until one lucky night on February 10th, while testing my new ASIAIR Mini.

Equipment: Williams Optics ZenithStar 61 telescope, Canon EOS Rebel T3i camera, iOptron CEM26 mount. 122 x 45sec frames at ISO800. Images were stacked in Astro Pixel Processor, Photoshop and PixInsight.



Solar Activity by J. Karl Miller

Taken on March 30th at prime focus through a Lunt solar telescope with a Canon EOS 60Da camera. Enlarged and lightly processed with the Preview app on an Apple desktop computer.

The Orion and Running Man Nebulae by Rob Lyons

This is a two-panel mosaic shot over two evenings with both an ASI533MC Pro colour camera and an ASI533MM Pro monochrome camera with the Sky-Watcher Quattro 150P telescope. Total exposure time is 8.5 hours. Editing done in Astro Pixel Processor, PixInsight, and Adobe Photoshop.