

NOVA

NEWSLETTER OF THE VANCOUVER CENTRE RASC
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The Challenges of Going to Mars

by Shay Pomeroy

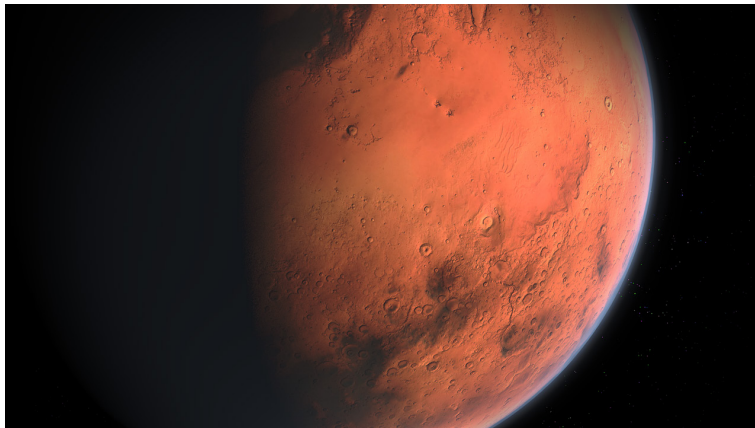
The last decade has seen a significant rise in the popularity of space exploration—with Mars being the most popular target. Space agencies such as NASA are [building Mars-focused missions](#), and even private companies, like SpaceX, have their eyes [set on the red planet](#).

Many would agree that bringing humans to Mars is the next milestone in our journey into the cosmos. However, despite our appetite for that first footprint on red soil, a mission to Mars is likely more challenging and dangerous than many realize.

So, what makes going to Mars so difficult?

There's a lot of radiation

A major concern with the journey to Mars is the levels of radiation astronauts will be exposed to. It's estimated that there will



be around 1.64 mSv a day in radiation exposure while in transit, which can be upwards of 9x the daily average of someone on Earth.

“Radiation doses accumulated by astronauts in inter-

planetary space would be several hundred times larger than the doses accumulated by humans over the same time period on Earth, and several

times larger than the doses of astronauts and cosmonauts working on the International Space Station.”
– [Jordanka Semkova](#) of the Bulgarian Academy of Sciences.

This could potentially lead to radiation-related health issues during the trip and prolonged cancer after astronauts return home.

“A large number of degen-

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SEPTEMBER 8 SFU/Zoom

Dr. Patrick Seitzer from the University of Michigan: A Changing Night Sky. Room AQ3159 and on Zoom. See Meetup for details.

SFU

OCTOBER 13 SFU/Zoom

Speaker TBD. Watch Meetup for updates and SFU room location.

SFU

NOVEMBER 10 SFU/Zoom

Researchers from SFU talk about how VR is helping scientists on Earth understand how astronauts perceive the Earth. See Meetup for details.

SFU



Elephant Truck Nebula by Rob Lyons

This is the Elephant Trunk Nebula in Cepheus. This was shot over 9 evenings in July on my William Optics Redcat 51 scope, Sky-Watcher AZ-GTi mount, ASI183MM Pro camera, and Antlia 3nm Pro filters. This is a grand total of 36.25 hours of exposure time and was shot from Kitsilano.

President's Message

Fall 2022 is a wild card. We still aren't quite sure about COVID. Will it shut us down this fall? Will we be forced back to only "on-line" again? Will we continue to resume more in-person events? We plan to continue hybrid monthly meeting with both in person and available by Zoom at the same time. We plan to open the Trottier

Observatory on monthly meeting nights for book lending and telescope lending to members. We will also have access to the telescope on clear monthly meeting nights once a month.

Summer of 2022 was better than 2021 for observing because the spring was late and wet which delayed wildfires that have been

less intense this year. However, recent wildfires are smoking out our sky. This did not dampen spirits of the attendees at last Friday night's Starry Nights at SFU. Over 220 guests visited the observatory and many of those and others stopped by one or more of our RASC member telescopes on site. It was chal-

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by Alan Jones

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 nec-

essarily 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.

2022 Vancouver Centre Officers

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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/

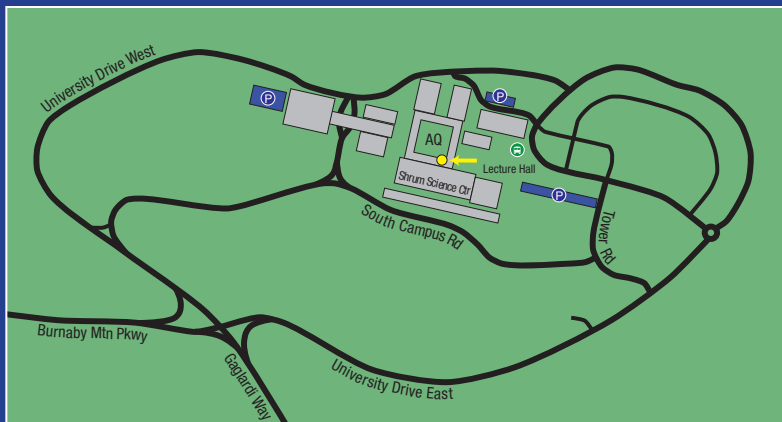


@RASC Vancouver

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Map to Meeting Site



Our September meeting is in room AQ 3159 of the Academic Quadrangle, near the southeast corner as indicated by the arrow on the map.

The meeting will also be livestreamed on Zoom.

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

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lenging to aim a Dobson at interesting targets with only a dozen visible stars in the smoke haze. Fortunately, the Moon, then Alberio (double) and finally Saturn, the sidewalk astronomy crowd pleaser, came to our rescue making an unbroken lineup for the entire time.

RASC-Vancouver participated in an amazing event in Aldergrove this year hosted by Metro Vancouver for the Perseid meteor shower. It was full moon and some of us did not expect to be able to see many meteors. That did not stop 3000 people from showing up to try. The crowd oooooed and ah-hhed many times and there were long line ups at our displays and telescopes. Luckily, nine RASC members volunteered for this event.

Fall is a wonderful time of the year for astronomy. The nights gain length, twilight is shorter and astronomical darkness returns to

our latitude. We often find good weather in September and if you can make it away from our light-polluted metropolis, you are in for a treat around new moon. BC is blessed with some amazing dark skies worth the effort to seek.

Do you remember when you first became interested in astronomy? And do you remember your first RASC meeting? I do remember it takes courage to step forward and meet other members. I ask members to help welcome new members and guests to our club. One of the most satisfying things we do in astronomy is share our enjoyment of learning about astronomy with other people. There is nothing quite like hearing someone else's excitement when they realise how nice it is to view objects through a telescope. It excites and awakens the delight of discovery in us at all ages. Make the effort to make it easy for new people to get to know us. That is one of the advantages of our return to in-person

meetings. Let's do it as safely as we can.

In closing, thank-you to the many member volunteers this summer. You are, through your dedication and effort, making it possible to host and co-host events, re-build and re-open our observatory, run special projects, host our website, publish the newsletter, welcome members, find speakers for monthly meetings, bring telescopes to Starry Nights, conduct the business of the society, and plan the future. In this spirit, I would like to thank departing Council member Hayley Miller for her enthusiastic dedication to organising events for our Centre over the past few years. This month also sees the departure of Ken Arthurs, our Director of Telescopes, who we wish well in his future endeavours. The Vancouver Centre is run entirely by generous quantities of volunteer labour. Join in the fun and volunteer to become involved. ★

Perseid Meteor Shower Event – Aug. 13

by Suzanna Nagy

As with most events over the past two years, the annual Perseid Meteor Shower event at Aldergrove Regional Park was on a two-year hiatus. In 2022, Metro Parks restarted the event with reduced registration for overnight camping. However, there were no restrictions on the general public entering the park for the event.

Suffice it to say, attendance at the event was overwhelming. Metro Parks estimated 3000 people attended the Saturday evening meteor shower event despite it being a full moon.

Your RASC Vancouver Centre was there with telescopes which had lineups all evening long. We also had the Jim Bernath Meteorite

Collection which fit in well with the event. People could get up close and personal to meteorites while at the same time watching them light up

the night sky as they streaked across.

Renuka Pompana
Jennifer Kirkey

Leigh Cummings
Robert Conrad
Terry McComas



the night sky as they streaked across. We also had 200 starwheels on hand, which were exhausted within the first hour and one-half.

A thank you to all the RASC vol-

unteers who attended, those being:

Looking forward to next year as the charts indicate the annual meteor shower for 2023 will peak closer to a new moon. ★

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 new observing director, revived 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-on-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

October

21 – Manning Park Dark Sky Weekend (Beginners)

28 – Manning Park Dark Sky Weekend (Advanced)

December

12 – AGM

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erative tissue (non-cancer) adverse health outcomes are associated with terrestrial radiation exposure, including cardiovascular and cerebrovascular diseases, cataracts, digestive and endocrine disorders, immune system decrements, and respiratory dysfunction.” – [Zarana S. Patel](#), Researcher at KBRwyle.

With so much on the line, even relatively minor issues such as decreased sleep, worse hand-eye coordination, and a negative effect on astronaut cardio health could be devastating. These challenges with radiation, while worse in transit, will also persist once the crew has reached the surface of Mars.

Of course, this isn’t an impossible challenge to solve, but it adds another engineering factor to the development of interplanetary spacecraft.

Long journeys are hard on our mental health

The round-trip journey to Mars will likely take around 1000 days or longer. For context, Apollo 11 was barely more than eight days and much closer to Earth if anything went wrong. Even if we ac-

cept the lack of available help in an emergency, we still don’t fully understand how the human body will hold up on such a long trip.

Mental health is a significant factor with astronauts stuck in a small spacecraft for such a long journey. On the way to Mars, astronauts will be relatively isolated and facing extreme confinement compared to the relative luxury of the ISS in LEO. Faced with a smaller communication delay and being in greater proximity to loved ones, astronauts on the ISS benefit from regular mental health support services and mood boosters such as crew care packages.

“Some of the most difficult challenges future space explorers may face will be psychological—because delving further into space than anyone ever has before means great danger and also grinding monotony. The isolation and stress will be extreme for those onboard, which can lead to issues such as depression, cognitive decline, and interpersonal conflicts. Even calls home to friends and family will experience a 5–20-minute delay, making a real conversation nearly im-

possible.” – [Albert Harrison](#), UC Davis psychologist.

The human body doesn’t do well in space

Deterioration of physical health will be a concern during the journey to Mars.

We’ve struggled with these challenges even within the relative safety of the International Space Station. For example, a known issue affecting astronauts today is fluid shifting within the eyeball itself, leading to changes in the shape of the lens and, ultimately, eyesight. It’s likely that similar issues will arise within the relatively small confines of an interplanetary spacecraft. This also doesn’t even begin to cover major medical emergencies or severe sickness.

Another acute example of the physical challenges faced by astronauts is related to bone density, body mass, and cardiovascular health. On the ISS, astronauts do about 2-3 hours of daily exercise to maintain their cardio fitness and muscle mass—this is especially important for heart health.

“Data from Mir missions show that bone loss continues in space despite an aggressive countermeasure



program. Average losses were 0.35% per month, but some load bearing areas lost >1% per month. A 1% loss rate, if it continued unabated for 30 months, could produce osteoporosis. Smaller losses could still increase fracture risk.” – [J C Buckey Jr](#), PubMed.gov.

This is especially concerning when considering the length of the journey to Mars and the associated physical risks of landing and undergoing activity on the planet’s surface.

Communication challenges

Mars is approximately 140 million miles from Earth and around 35 million miles at its closest approach. Even though

the red planet is relatively close to us generally, there will still be a communications delay of up to four minutes. While this seems minor, in an emergency, that’s four minutes to send a message to Earth and another four minutes to receive it.

While these challenges seem daunting, solving them is a critical part of humanity’s next chapter in the cosmos. The good news is that many of the mentioned challenges are already being worked on. For example, the upcoming [Artemis missions](#) will be a big step to solving many of the issues above by gathering data to better understand future Mars travel.

Despite lofty promises and subsequent delays, humans will still likely set foot on the red

planet in many of our lifetimes. If we genuinely want to be an interplanetary species, Mars is the most accessible destination and potentially a stepping stone into the wider Solar System and beyond. ✨

Sources

- *American Psychological Association*, [Mental preparation for Mars](#)
- *Nature.com*, [Red risks for a journey to the red planet: The highest priority human health risks for a mission to Mars](#)
- *University of Colorado Boulder*, [Help is a long way away: The challenges of sending humans to Mars](#)
- *Phys.org*, [Every challenge astronauts will face on a flight to Mars](#)

An Experiment

by J. Karl Miller

In the late 1980s, my wife and I moved to Toronto for a limited time. During our stay there (about 3 1/2 years), I joined the RASC Toronto Centre, but I also kept my

in Ontario can be very cold, so you have to be prepared to have some related effects on your telescopes (and yourself—dress accordingly).

Occasionally, cold air's low rela-

to clear the lenses. In general, that means fairly large, portable batteries, or a connection to your vehicle, or gasoline-driven generators. These requirements made me try another



The black dew cap mounted on the front end of the orange C8 telescope. The 5 resistors are attached inside the dew cap, where the dew cap and telescope meet.

membership in the Vancouver Centre. The Toronto Centre also has a group of people who observe the sky actively. Just as here in Vancouver, light pollution problems in the city made us look for a darker sky, but within a reasonable driving distance. During fall and winter, clear nights

tive humidity will fog up your telescope's lenses' external surfaces. Since wiping them by hand is always a bit chancy, some "no-touch" method is preferred. That usually requires some electric power supply to run a "gentle" warming fan or use some other warming method

approach.

Many telescopes come with "dew caps," meant to counter the fogging of optics. I own a C-8 telescope, whose performance and portability make it ideal for observing at various locations. My C-8 did not come with a dew cap, but I found one la-

belled as made by Nova Astronomy-Products in Toronto. It fit the C-8 nicely. Since my working activities involved electronics, I thought of trying a simple experiment involving standard, small sized resistors (1 to 2 watt rated) to come up with a low-powered warming system to repel some more humidity.

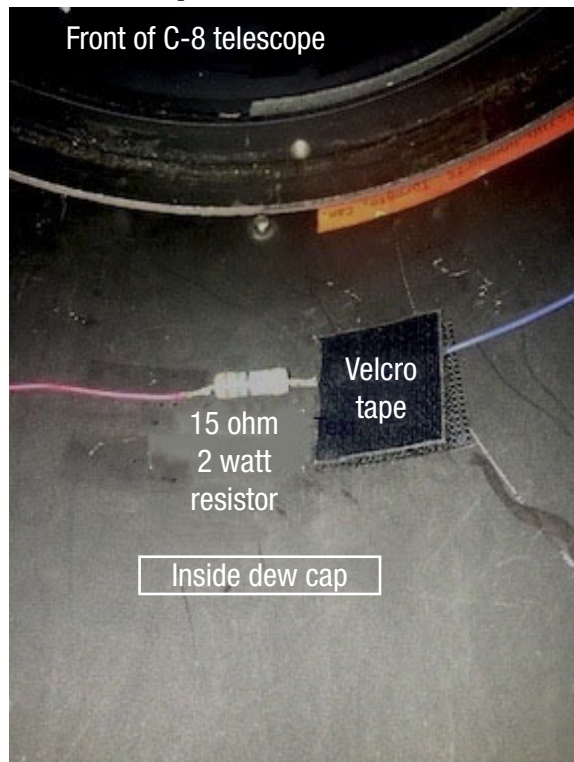
I decided to use 5 resistors with a heat rating of 2 watts and a resistance of 15 ohms each (mainly because I had them on hand) and taped this series of resistors into the dew cap so that the resistors are placed near the front of the C-8 when the dew cap is attached to the

C-8. The amount of heat generated is small. If you apply 12 volts to the resistor series (total of 75 ohms resistance), you'll get slightly less than 2 watts as the total amount of heat generated. Each resistor contributes a little less than 0.4 watts.

One caution: If you double applied voltage, you will get four times the heat; four times the voltage gives you sixteen times the heat. Remember that the resistors I used can handle only a maximum of 2 watts each. The effects of voltage and electrical current changes occur in the domain of the

square of their original values. You can exceed ratings and do damage very quickly. Stick with your original values.

You may want to try something similar to what is described above. The "small scale" warm-up arrangement worked reasonably well (and is still, more than 30 years later) at moderate humidity levels. It requires very little electrical power, so that there is little demand on a battery used for powering other functions on your telescope. *

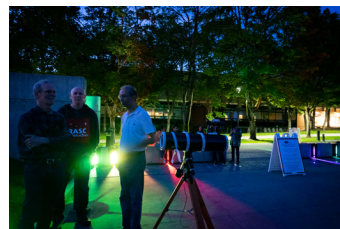


Inside the dew cap, one of the 15 ohm, 2 watt, resistors is shown in front of the C8. Held in place by a small piece of Velcro



Note the 5 resistors deep in the C-8 dew cap, just in front of the C-8 telescope. They are connected as a series circuit. You can see the wire which connects one to the next. The 2 wires for connecting the resistors to the external voltage source are a small bundle at the lower left, on top of the tripod telescope mount

Starry Nights at SFU



Images courtesy of Martin from the UBC Astronomy Club

Members' Gallery



22° Solar Halo by Douglas Filipenko

A sun halo is the result of light refraction by tiny hexagonal ice crystals that are suspended within high, thin cirrus clouds. According to Johanna Wagstaffe, meteorologist with CBC, the 22-degree sun halo phenomenon is quite common along the West Coast. We often get weather patterns that combine a sunny day with warm surface temperatures and cold high-level atmospheric air flows.

Taken from Tenth and Trimble on May 22, 2022 around 4 pm..



Tofino Milky Way by Rob Lyons

This is the Milky Way from North Chesterman Beach, Tofino, BC on Aug 30th, 2022. The sky is 13x120-sec. images stacked and the foreground is a single 30-second exposure at twilight. Shot on my modified full spectrum Sony A7R with a Tamron 17-28mm f/2.8 lens and Kolari Vision h-alpha uv/ir cut filter.