



Volume 61 – No.11 – December 2022



Send submissions to: astronotes@ottawa.rasc.ca .

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Editor's Message

Well, this is December and our Annual General Meeting with elections and awards. I want to start by thanking our outgoing President, Stephen Nourse. Along with all the regular duties of his role, he had to deal with the challenges of keeping our Centre operational in the face of COVID 19 and he (and his team) did an amazing job. Thank you, Stephen.

Congratulations to our new President, Dave Chisholm; Vice President, Oscar Echeverri; new Councilor and Star Party Coordinator, Katie Francis; and Public Outreach Coordinator, Asser ElGindy. Thank you all for stepping forward. To the returning members of Council, welcome back and thank you for continuing in your roles. To departing Ted Bean Telescope Librarian Darren Weatherall, thank you for your years of service in this role.

Another departure from Council is Carmen Rush. Carman has been on Council for as long as I can remember, and her contributions are immeasurable. Her quiet consideration and shared wisdom will be missed. Thank you, Carmen, for all you have done.

There is also an important announcement in this issue. Council had an opportunity to put forward a member's name to be assigned to an asteroid. It was recognized as a chance to honour Chris Teron for all he does and continues to do for our Centre. It is official, Asteroid 10486 is now Asteroid Teron. Congratulations Chris!

On a side note, Chris becomes the twelfth member of Ottawa Centre to have an asteroid name after them. We will have more on this in a coming article. Likely in the spring.

This is a huge issue at over 70 pages. I had to bump Bob Olson's article on Star Removal Processing until next month. Sorry Bob!

Clear skies and stay safe,

Gordon

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The Naming of an Asteroid

Every year at this time we, RASC Ottawa Centre, award those members who have distinguished themselves over the year through their observing accomplishments, their writing prowess, their volunteer efforts or their contributions to the club. We even have special awards for those times when one of the other awards just doesn't quite fit. But what do you do when you want to honour someone who has given to our Centre tirelessly for as long as anyone can remember, who has contributed to almost every event or activity undertaken, who is always involved in making our Centre operate? Well, that is a dilemma several Councils have struggled with over the years when trying to find a way to honour Chris Teron.

As you know, Chris is our Secretary and has been as far back as I am aware of. When we were meeting in person, Chris was our A/V person, setting up microphones and cameras to record our meeting and later post them to YouTube. Chris is our Centre's archivist. He has been the warehouse person on more than one occasion when things needed to be stored somewhere for longer periods of time (Thank you Louise). If something needed to be built, he was there with tools and blueprints in hand. Major outreach events like eclipses or Astronomy Days, Chris was likely involved in the co-ordination and planning as well as being there with a smile and a telescope. Chris maintains our Centre's membership email lists. He looks after obtaining and distribution of calendars or the group orders for software. If there is a problem that needs solving, a task that needs doing, a volunteer who needs a hand to accomplish what they undertook, a memory that need jogging, Chris is there. Chris is the humble heartbeat of Ottawa Centre and where we would be without him, I can't imagine.

In mid-June, Peter Jedicke (RASC London) reached out to local centres on behalf of RASC National to solicit names for possible asteroid naming honours by the International Astronomical Union's Minor Planet Center. Realising that this would be a perfect way to honour him, RASC Ottawa President Stephen Nourse and Vice-President Dave Chisholm immediately supported the nomination of club Secretary Chris Teron, whose name had been proposed to RASC National on an earlier occasion by a previous president and council.

Here is the official announcement from Peter Jedicke:

I'm pleased to share with you that Chris Teron now has an asteroid named after him. The new list was released this afternoon. Here's the citation, from page 7 of this webpage

www.wgsbn-iau.org/files/Bulletins/V002/WGSBNC Bull_V002_015.pdf

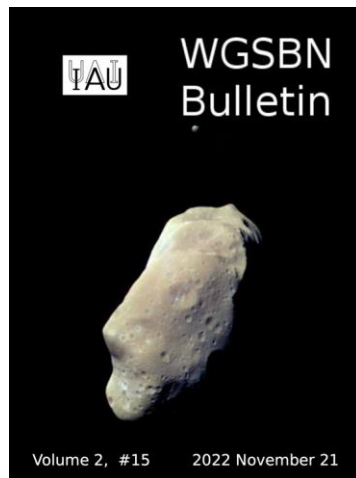
(10486) Teron = 1985 CS2

Discovery: 1985-02-15 / H. Debehogne / La Silla / 809

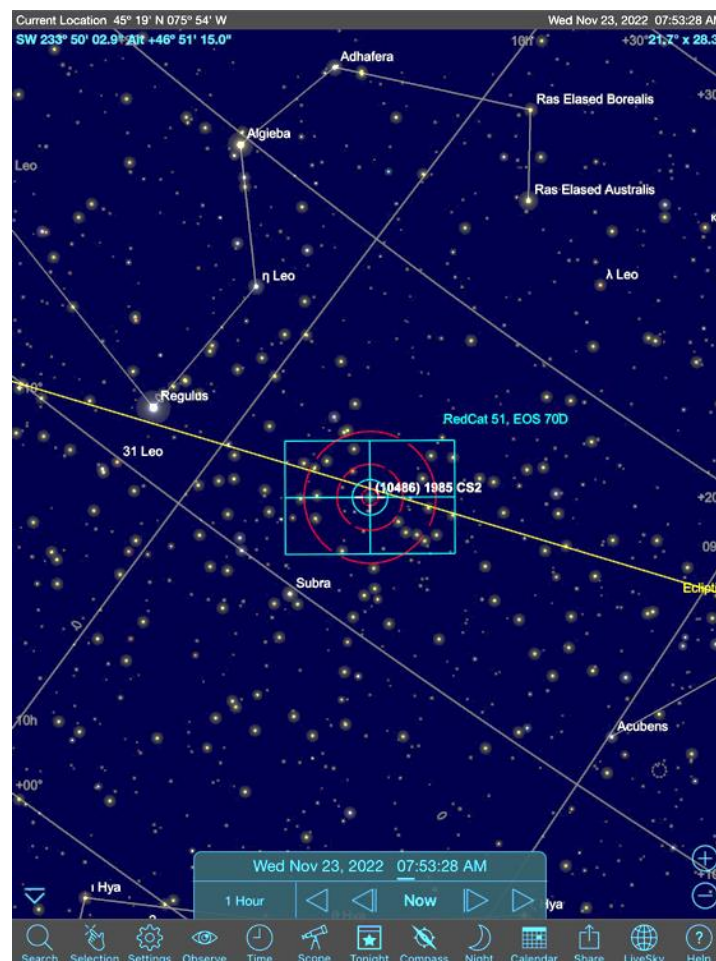
Chris Teron (b. 1957) is a Canadian architect and amateur astronomer. He is RASC Ottawa Centre's long-serving Secretary and A/V support person, and active in public outreach. Chris was a director and facility designer for Ottawa Centre's 2001 millennium SmartScope project and offered key technical support to the 2006 and 2017 RASC General Assemblies.

The announcement of Asteroid Teron was to have been made at this month's AGM as a surprise to Chris. Unfortunately, someone from National phoned him to congratulate him despite a request to keep it quiet until after the meeting. I know I speak for the entire Centre when I say that this is an honour well deserved and still totally inadequate. For all you do Chris, thank you and congratulations,

10486 1985 CS2 FACTS



Type	Asteroid
Absolute Magnitude	14.43
Longitude Of Ascending Node	295.05709°
Argument of Perihelion	295.5671°
Mean Anomaly	227.54689
Semi-Major Axis	2.2918246 A.U.
Near Earth Object	No
Mean Orbit Velocity (km/h)	1.00
Average Orbit Distance (km)	1.00
Orbital Inclination	3.99076°
Orbital Eccentricity	0.0931269
Source(s)	Minor Planet Center
Modified Date	13th November 2022
Published Date	27th March 2019



2022 RASC Ottawa Centre President's Report

It seems like only yesterday that I was assuming the Centre presidency and now here I am two years later writing my final President's Report. It has been a busy two years despite, and sometimes because of, COVID 19. I sincerely hope that I will be the only Ottawa president to never actually preside at an in-person council or monthly meeting. It's not that either have overtly suffered as a result of going virtual, it's just a different dynamic. One I prefer in person when possible. That being said there has been significant positive feedback on aspects of the virtual monthly meetings. Enough for council to make the decision to definitely hold them in a hybrid virtual/in-person format when we are able to return to in-person. Speaking of which, there are indications that we will be able to return to the Canadian Aviation and Space Museum sometime in the new year.

First and foremost, I have to thank all the fabulous people whose volunteer efforts not only keep our wonderful centre functioning but make a president's job even possible. Obviously, the rest of council and the various appointed positions come first to mind. There are also a host of others who help out in so many ways from assisting in outreach and star parties, mowing grass, fixing stuff, or just providing sage advice when needed. To each and every one of you, thanks. I could not have been successful without you.

Speaking of council, I would like to single out and give thanks to a truly dedicated volunteer who is stepping down after an astonishing 15 years on council. Carmen Rush is leaving council and will be sorely missed. The only thing that softens this a little bit is that she has assured us that being off council will give her time to bring back her astronomical history talks that are so popular.

And that segues into talks at our monthly meetings. Wow, is it just me or is everyone else impressed with the quality and variety of talks that Mick Wilson is able to assemble every month? Each month seems to have a mix of informative talks, solid how-to tech advice, and of course those stunning member images. However, don't let the calibre of what you see put you off from coming forward and contributing. I personally have found some of the most enjoyable talks and interesting images have come from younger and/or first-time presenters. It is a wonderful non-judgmental place to jump in and hone your skills. Don't worry about making it look perfect. Either Mick or Chris Teron, our secretary extraordinaire and techno wizard behind the scenes at the monthly meetings, will make sure that is taken care of. Perhaps the only concern I have with our monthly meetings is that a newcomer to them may find themselves wondering - what the heck is a quocca and what does it have to do with astronomy?

Our centre finances are ably overseen by our treasurer, Richard Taylor. Without usurping his report, which will come next, suffice to say we are fortunate to continue to be in good financial shape. This has enabled us to continue improving how we can serve our members without increasing the Ottawa centre portion of membership fees. In fact, council is already working on some initiatives to enhance our existing programs. You will be hearing more about that in the new year.

Speaking of member fees, you undoubtedly have noticed a significant increase in the RASC National portion of them. The manner in which this was rolled out and communicated, along with some other aspects of the Centre – National relationship, is concerning. Concerning not only to Ottawa Council but a number of other centres as well. A strongly worded joint letter was sent to the RASC Board of Directors and a dialog has started with them as a result. There is a need to redefine our relationship to reflect the current needs and expectations of members. This is normal as a society such as ours has to evolve and adapt as things change. After all we are over 150 years old!

Another aspect of our centre with a long history is of course AstroNotes. Although changing in format many times over the years as technology has progressed it continues to inform and entertain our members. Our editor, Gordon Webster, is so successful in obtaining, some would say coercing, content that it's a good thing it's emailed now. It would be a massive undertaking, not to mention cost, to print and send it out via snail mail.

Sadly, once again our Annual Dinner Meeting had to be cancelled for 2022, making it the third year in a row we have not had one. For a while there was real hope it would be held this year, but the September wave finally did it in. There is hope for next year though. As well plans are afoot for some sort of outdoor event in 2023 when the weather once again warms up.

We did happily see the return of public star parties in 2022. Thanks to the efforts of Andrea Girones and her team the popular Carp Diefenbunker parties were held once again. Scheduling and weather worked to hold four of them this year. One of the parties had an estimated 500 plus participants which has to be some sort of record for that location. Well done, Andrea! In addition, the monthly member's only star parties at Fred Lossing Observatory (FLO) continue to attract a loyal following.

2022 marks another banner year for FLO. Our Observatory Director, Rick Scholes and a host of volunteers, have had another great year of upgrades and installations, not to mention staying ahead of the normal maintenance and upkeep. The Rolf Meir telescope is now fully commissioned, and members are being trained on its use. Paul Klauninger has the Paul Comison telescope in final testing and calibration and the training guide for it almost finished. The Mike Wirth telescope continues to provide great views and images. The new Haven mosquito system is really appreciated during bug season. Between the centre telescopes and the viewing facilities there is something for everyone at FLO.

I would be remiss in this report if I did not mention the passing of Frank Bayerl. Frank was a member for over 20 years and will be missed.

On a happier note, we recently learned that our long-time centre secretary, Chris Teron, now has an asteroid named after him. The International Astronomy Union has named asteroid 10486 as Teron. This is well deserved as Chris is so involved in all things astronomy. His contributions include outreach, FLO, monthly meetings, unofficial centre Historian, centre Secretary, and so much more. Congratulations Chris!

The Ottawa centre continues to take an active role in ensuring the protection of the former Dominion Observatory (DO) here in Ottawa. It is under threat from the new Ottawa General Hospital campus being constructed adjacent to it. Thanks to a dedicated group of volunteers the Historic Sites and Monuments Board is considering additional protection at their meeting this December. We are also working with Heritage Ottawa along with federal and local politicians to further minimize any impact and preserve the potential for future use of the historic observatory.

In leaving I challenge all of you to reach out to friends, neighbours, strangers, and share your enthusiasm for the night sky by encouraging them all to look up.

Clear Skies.

Stephen Nourse
President, Ottawa Centre RASC
Dec 2, 2022

Election Results

Stephen Nourse RASC Ottawa Centre – President

PRESIDENT & Director	Dave Chisholm
VICE PRESIDENT & Director	Oscar Echeverri
SECRETARY & Director	Chris Teron
TREASURER & Director	Richard Taylor
COUNCILLORS	Katie Francis
	Gerry Shewan
	Jim Sofia
MEETING CHAIR	Mick Wilson
PAST PRESIDENT	Stephen Nourse
NATIONAL COUNCIL REPS	Johnathan Falbo
	Mick Wilson
	Open

Acclaimed



Proposed Appointed Positions

STAN MOTT LIBRARY	Estelle Rother
WEBMASTER	Mick Wilson
ASTRONOTES EDITOR	Gordon Webster
F.L.O. DIRECTOR	Rick Scholes
LIGHT POLLUTION	Andrea Girones
PUBLIC OUTREACH	Asser ElGindy
PUBLIC STAR PARTIES	Katie Francis
HOSPITALITY	Open
TED BEAN LOAN LIBRARY	Open
MEMBERSHIP	Art Fraser

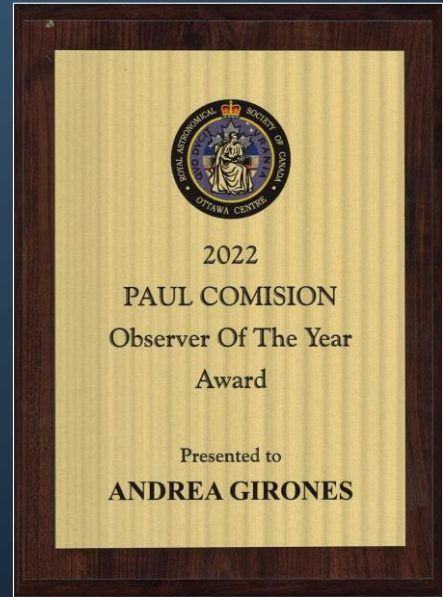


RASC Ottawa Centre Awards for 2022

Paul Comision Observer of the Year Award



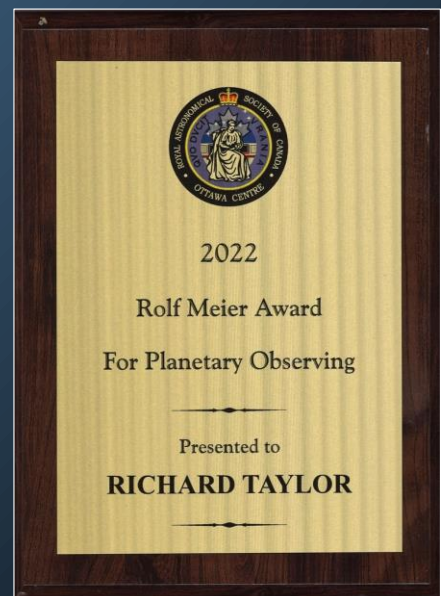
Andrea Girones



Rolf Meier Award for Planetary Observing



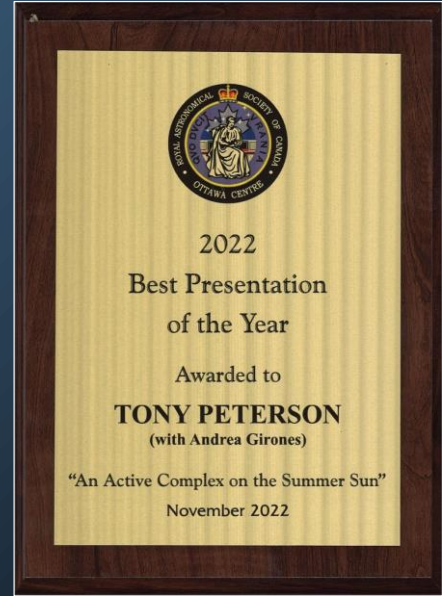
Richard Taylor



Best Presentation of the Year



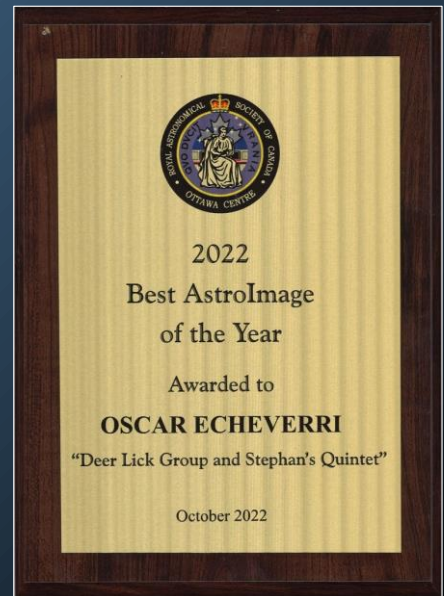
Tony Peterson
(with Andrea Girones)
“An Active Complex
on the Summer Sun”



Best AstroImage of the Year



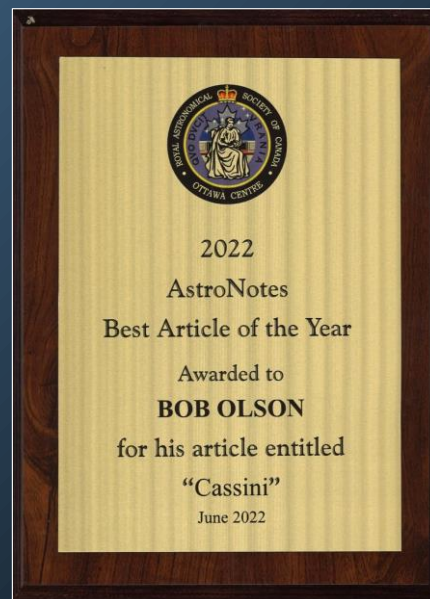
Oscar Echeverri
“Deer Lick Group
and Stephan’s Quintet”



Best AstroNotes Article of the Year



Bob Olson
"Cassini"
June 2022 Issue



Best AstroNotes Article of the Year

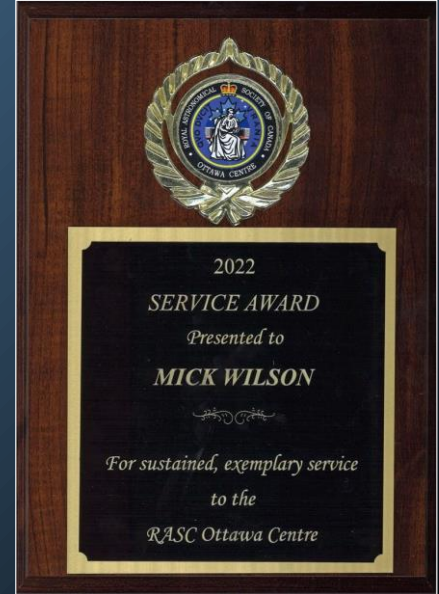


Honourable Mention
Mick Wilson
The Very Future of Canadian Astronomy
October 2022

Service Award



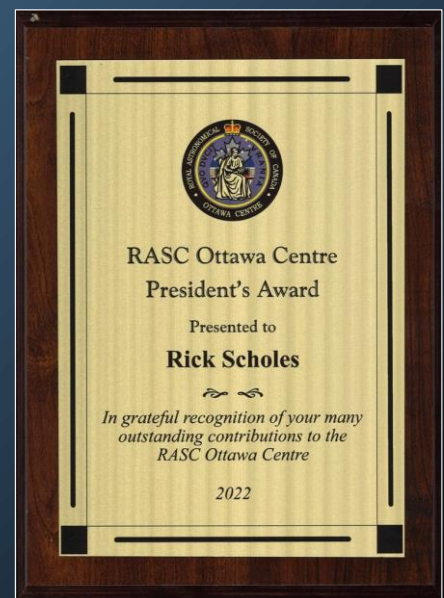
Mick Wilson



President's Award

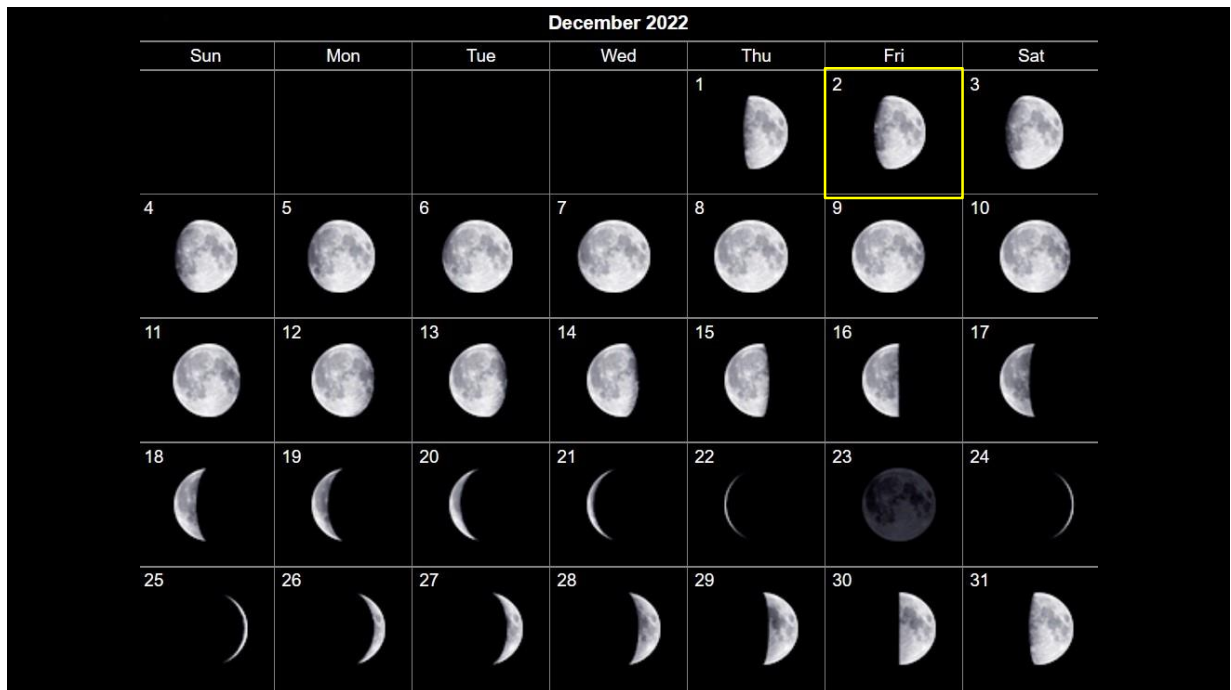


Rick Scholes



Ottawa Skies

By David Chisholm



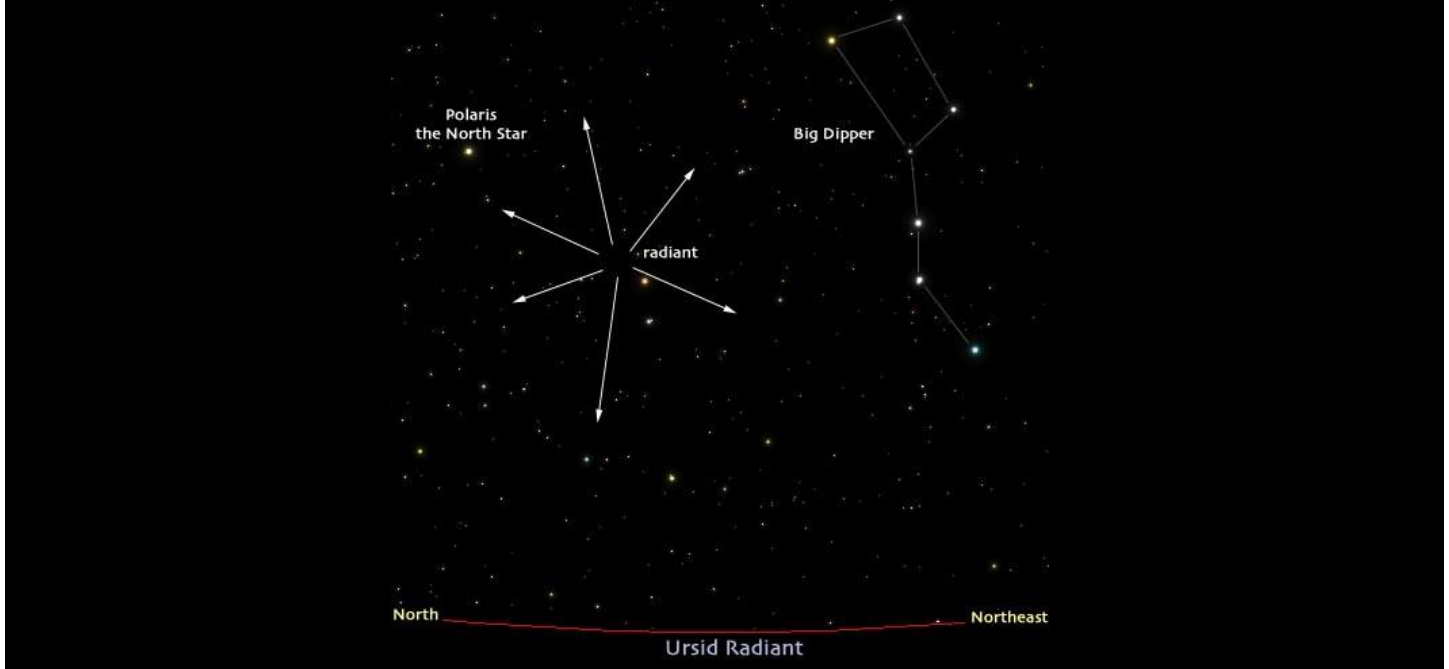
December 8 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 04:09 UTC. This full moon was known by early Native American tribes as the Cold Moon because this is the time of year when the cold winter air settles in and the nights become long and dark. This moon has also been known as the Long Nights Moon and the Moon Before Yule.

Geminids Meteor Shower – December 13/14



December 13, 14 - Geminids Meteor Shower. The Geminids is the king of the meteor showers. It is considered by many to be the best shower in the heavens, producing up to 120 multicolored meteors per hour at its peak. It is produced by debris left behind by an asteroid known as 3200 Phaethon, which was discovered in 1982. The shower runs annually from December 7-17. It peaks this year on the night of the 13th and morning of the 14th. The waning gibbous moon will block many of the fainter meteors this year. But the Geminids are so numerous and bright that this should still be a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Gemini but can appear anywhere in the sky.

Ursids Meteor Shower – December 21/22



December 21, 22 - Ursids Meteor Shower. The Ursids is a minor meteor shower producing about 5-10 meteors per hour. It is produced by dust grains left behind by comet Tuttle, which was first discovered in 1790. The shower runs annually from December 17-25. It peaks this year on the the night of the 21st and morning of the 22nd. This year, the nearly new moon will leave dark skies for what should be a really good show. Best viewing will be just after midnight from a dark location far away from city lights. Meteors will radiate from the constellation Ursa Minor but can appear anywhere in the sky.

Quadrantids Meteor Shower – January 2/3



January 3, 4 - Quadrantids Meteor Shower. The Quadrantids is an above average shower, with up to 40 meteors per hour at its peak. It is thought to be produced by dust grains left behind by an extinct comet known as 2003 EH1, which was discovered in 2003. The shower runs annually from January 1-5. It peaks this year on the night of the 3rd and morning of the 4th. This year the nearly full moon will block out most of the fainter meteors. But if you are patient, you may still be able to catch a few good ones. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Boötes but can appear anywhere in the sky.



Sun

December 1

Rise / Set 07:22/16:21

December 31

Rise / Set 07:43/16:29



Mercury

Rise/Set 08:38/16:51 -> 09:00/17:43

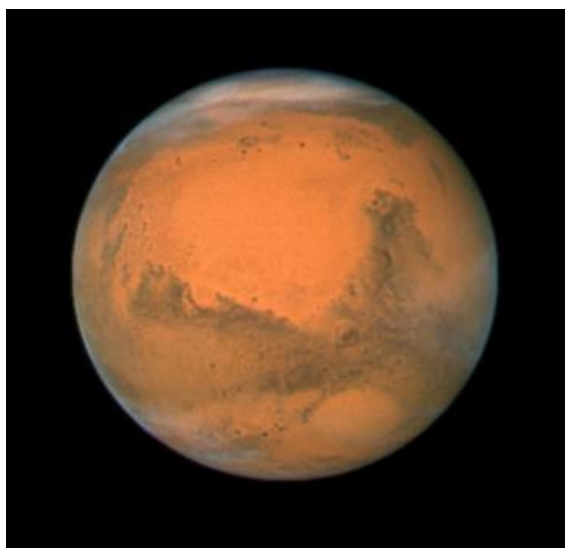
December 21st – Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 20.1 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.



Venus

Visible in the early evening.

Rise/Set 08:17/16:49 -> 08:56/17:41



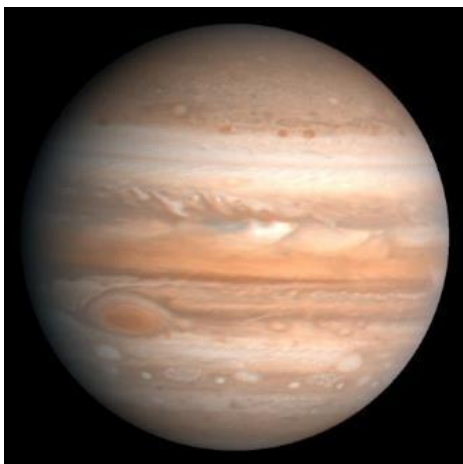
Mars

Visible in the evening.

Rise/Set 16:35/08:22 -> 13:58/05:40

At opposition December 8th.

Mars at Opposition. The red planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. It will be brighter than any other time of the year and will be visible all night long. This is the best time to view and photograph Mars. A medium-sized telescope will allow you to see some of the dark details on the planet's orange surface.



Jupiter

Visible in the evening.

Rise/Set 13:25/01:12 -> 11:31/23:23



Saturn

Visible in the evening.

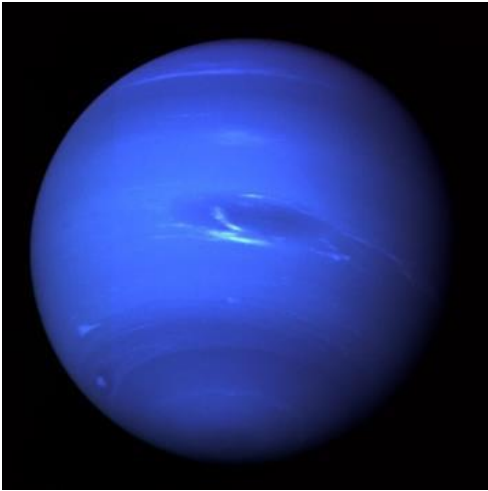
Rise/Set 11:59/21:41 -> 10:07/19:56



Uranus

Visible evening and through night.

Rise/Set 15:05/05:24 -> 13:05/03:21



Neptune

Visible in the evening.

Rise/Set 13:11/00:39 -> 11:13/22:39

Planet Visibility 2023

	Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune
January	AM (30 th)	PM	PM	PM	PM	PM	PM
February	X	PM	PM	PM	PM (1-15)	PM	PM (1-15)
March	X	PM	PM	PM	X	PM	X
April	PM (11 th)	PM	PM	PM (1-15)	X	PM	AM (15-30)
May	AM (29 th)	PM	PM	X	AM	X	AM
June	X	PM	PM	AM	AM	AM	AM
July	X	PM	PM	AM	AM	AM	AM
August	PM (9 th)	PM	PM	AM	PM	AM	PM
September	AM (2 nd)	AM (15-30)	X	PM	PM	PM	AM
October	X	AM	X	PM	PM	PM	PM
November	X	AM	X	PM	PM	PM	PM
December	PM (4 th)	AM	X	PM	PM	PM	PM

The 2022 Fred Lossing Observatory Annual Report

By Rick Scholes

The following article is a summary of the report provided to council on fiscal 2022 (1 Oct. 2021 through 30 September 2022) activities and status at FLO. All photos are by the author unless otherwise noted.

Activity Highlights

Site use was regular this year. There were no pandemic-related shutdowns. The logbook shows a total of 51 site visits for night observing by one or more people.

FLO star parties were well attended when the skies and temperatures cooperated. Attendance was 12 in April 7 in June, 30 in August, and 11 in September. Several private outreach sessions also took place.

Google Group and Site Use Guidelines

There is a google group specifically for FLO users with about 55 members. Posts are made to this group when there are specific equipment or site updates, or notifications of training on the club telescope. Posts are relatively infrequent. Send an email to flo@ottawa.rasc.ca if you wish to opt into this group.

A new document entitled “General Site Use Guidelines” was released in February. It expands upon the capsule summary provided on our website under the FLO site use guidelines tab, with lots more information and photos to orient new users. Please read this document if you plan to visit FLO.

Site Upgrades

Site electrical upgrades were completed by contractors in November 2021. A new breaker panel and meter were installed – the original breakers were obsolete and unavailable, and corrosion had occurred. Buried power lines were brought to the new structures on the north mound. The dome is on a 15A circuit, while the SkyShed Pod and external deck outlets (for users who bring their own scopes) are on a separate 20A circuit.

“Haven” mosquito repellent systems were acquired by Gordon Webster and installed in June on both observing mounds. Each system has 5 fixtures covering about a ten-foot radius. Controllers are mounted outside the Starmaster building and on the SkyShed deck. Instructions for use are posted inside the clubhouse. Feedback on their effectiveness has been positive.

The clubhouse and each of our telescope buildings have new signs made and installed by Stephen Nourse. Trees and bush obstructing our view of the sky are an ongoing challenge. This year Rick White did a considerable amount of brush clearing around the south mound and kept the access lane trimmed. The derecho storm in May caused no damage or lane blockages on site.

18" Starmaster Telescope

The User Guide and Quick Reference documents were both fully revised and updated in April. Two new trained users were added, bringing the total to 13. A number of people are partially trained as we wait for clear skies and personal schedules to coincide.

6" Refractor Telescope

Setup and commissioning of the Rolf Meier Memorial telescope and dome were completed this year. Several upgrades were implemented to make the structure both user-friendly and secure; a dome rotation crank, a solid door with an electronic deadbolt, and a shutter locking mechanism were all added. The detailed user guide and quick reference documents were released in September. Currently two new users have been trained. Those who have viewed the major planets through the telescope have been favourably impressed. The equatorial pier-mounted telescope is permanently polar aligned, and a motor drive provides accurate object tracking. Object location is largely a manual operation, with no motorized slewing or GoTo.

14" Meade SCT

The Paul Comision Memorial telescope became operational this year as well. Polar alignment, software upgrades and star alignment have largely completed its commissioning. Training documents are being written by Paul Klauninger, in parallel with astrophotography tests being conducted by Richard Taylor. Training sessions will be offered in the coming months once the user guide is released.

RASC Ottawa Fred Lossing Observatory (FLO): General Site Guidelines

This document provides the general guidelines to follow when visiting the Fred Lossing Observatory. All RASC Ottawa members may use the site free of charge with their own observing equipment. They may also join observers who are using the club telescopes, but not operate them unless certified. Members are permitted to bring family members and one or two guests. Non-members must be supervised and may observe, but are NOT permitted to handle or operate club equipment.

The club telescopes at FLO are not covered in this document. They have separate user guides specific to each instrument. To operate a club telescope, members must familiarize themselves with the applicable user guide, attend training sessions, and pass a certification test.

The observatory is located at 365 Bennies Corners Rd, Mississippi Mills, Ontario. The site is accessed via a locked gate and entry lane. The same gate code combination opens the clubhouse door. To obtain this code contact the observatory director at: flo@ottawa.rasc.ca



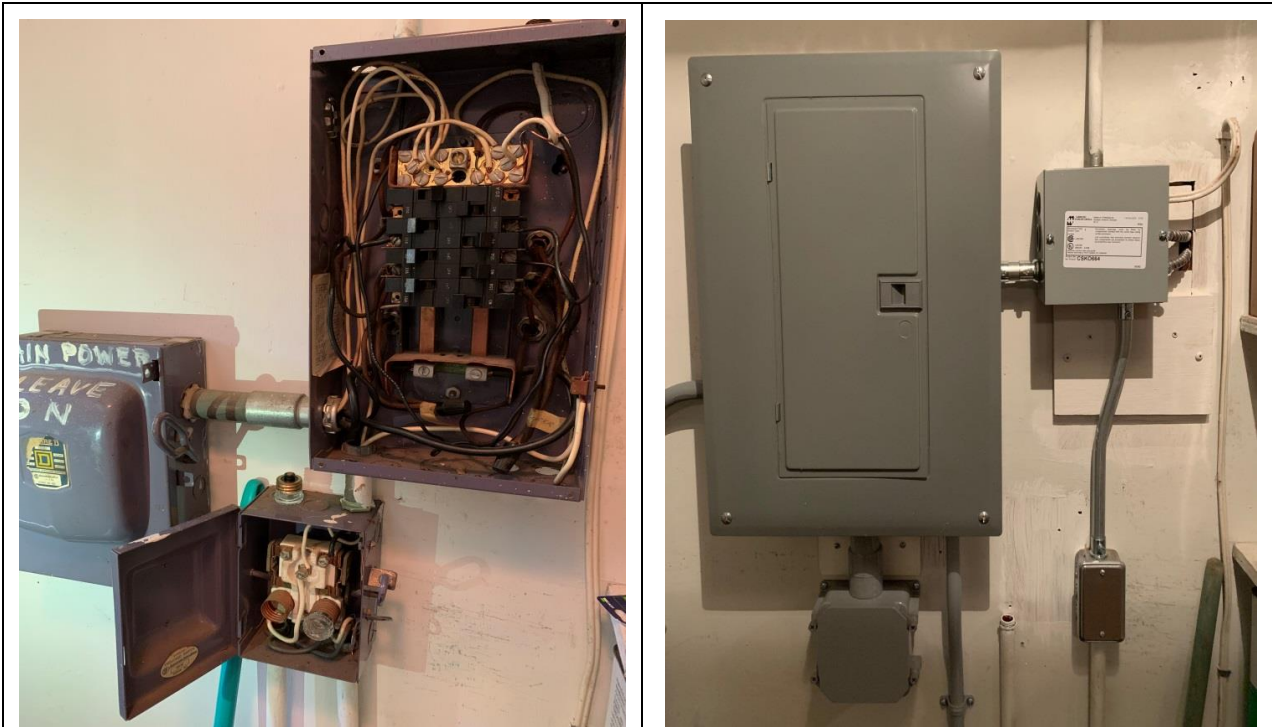
FLO entrance gate at 365 Bennies Corners Road



Clubhouse with Schlage electronic lock & lockbox

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Old (left) and new (right) breaker panel installed in the clubhouse in November 2021



New exterior power outlet on the north mound deck, Haven system, and new sign, October 2022



Haven mosquito repellent system being installed by Gordon Webster on the south mound, June 2022



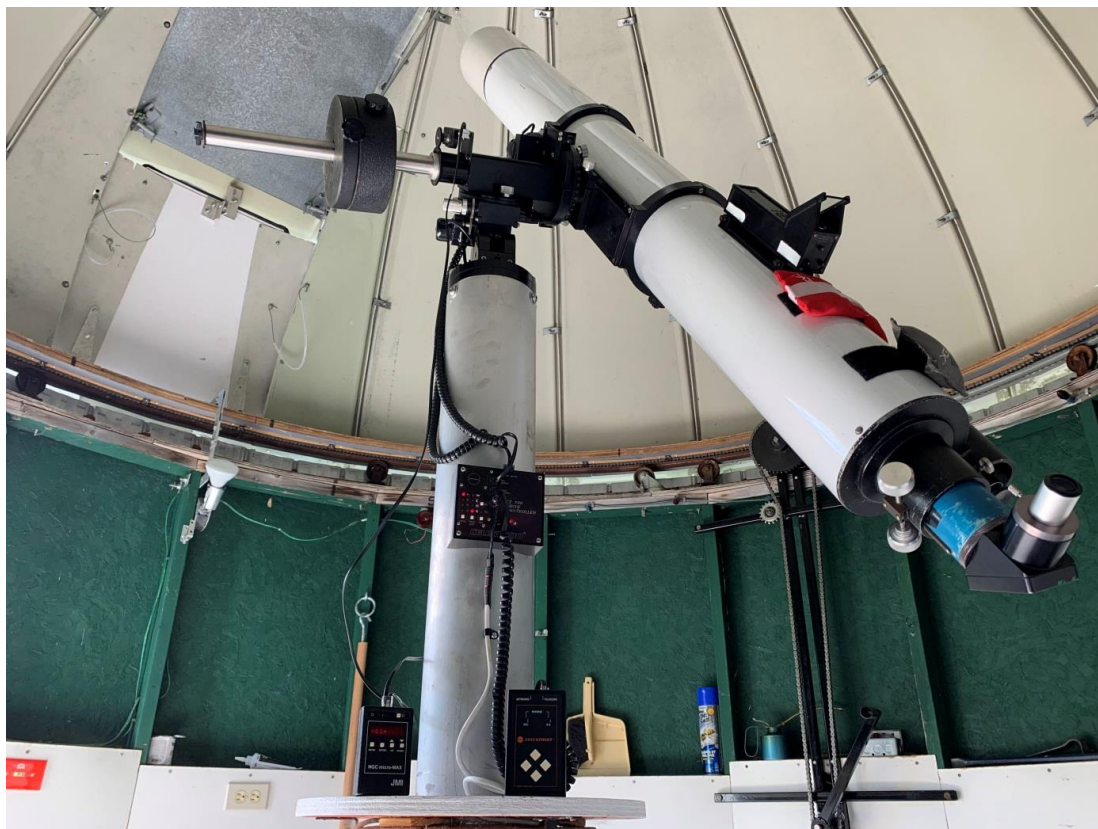
New clubhouse sign made by Stephen Nourse, September 2022



Rick White clearing brush around the south mound, September 2022



The completed Rolf Meier Memorial Telescope in the dome at FLO, August 2022



The 6" refractor with motor drive and dome rotation crank (in the background), August 2022



The Meade 14" SCT with autoguider and Telrad installed (photo by Paul Klauninger)

Member Profile

Brian McCullough



In the fall of 1989, a few months after I joined RASC Ottawa at the invitation of friend David Robinson, famed astronomer Clyde Tombaugh visited Ottawa Centre to tell us the story of his momentous discovery of Pluto in 1930. It was a fascinating presentation, and one that inspired me to hunt down the solar system's ninth planet

(as it still was then) a dozen years later. The series of visual observations I made using a 10-inch Dobsonian reflector from my Kanata backyard to monitor and sketch magnitude-13.8 Pluto's movement against the background stars was thrilling and remains my most personally satisfying observation to date.

I was delighted to receive the Observer of the Year award for my observations of Pluto in 2001, but what made that doubly sweet was thinking back to Clyde Tombaugh's reaction in 1989 when I asked him to autograph the annual Pluto finder chart in my very first RASC *Observer's Handbook* given to me by membership coordinator Art Fraser. Clyde looked up at me and smiled. "No one's ever asked me to do that before," he said.

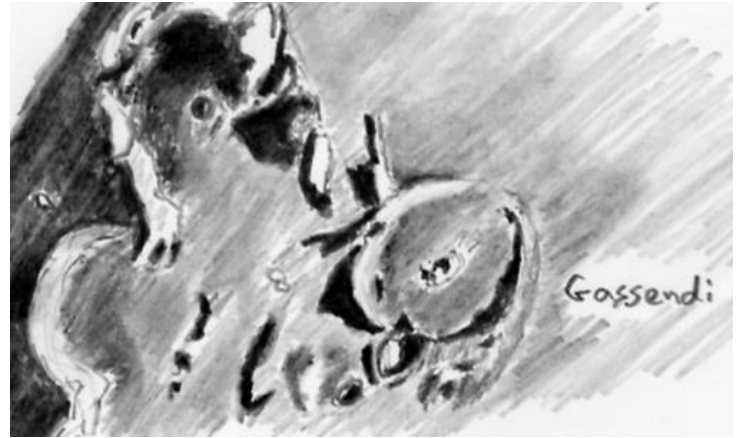
I have enjoyed many other wonderful astronomy/space moments – seeing the moons of Mars through Paul Boltwood's backyard telescope, gasping as the blackened Comet Shoemaker-Levy 9 fragment impact sites on Jupiter rotated into view, and examining Apollo thin-slice samples through geologist Anne Marie Pickersgill's microscope at Western University. These all stand out as real highlights.

One of my favourite astronomy moments occurred without my even being there...when my astrophysicist daughter Emily showed Apollo 17 moonwalker-geologist Harrison "Jack" Schmitt a photo of my "colourful" meteor impact demo during his visit to Western University. She also conveyed my message that the Apollo program he was part of continues to inspire me to share the Moon with people everywhere, and however possible. (Remember the marshmallow moon?)



It was also an honour some years ago to invite none other than original Beatle's drummer Pete Best and his band mates to view Jupiter through the eyepiece of a telescope following the Canada Day celebrations in Kanata. I have a signed drumstick from him as a memento.

And, of course, having an asteroid named after me in 2021 was one of those moments I still don't know how to process. I mean, what do you do with that? People have been incredibly generous to me throughout the astronomy community, and I love being part of this wonderful family.

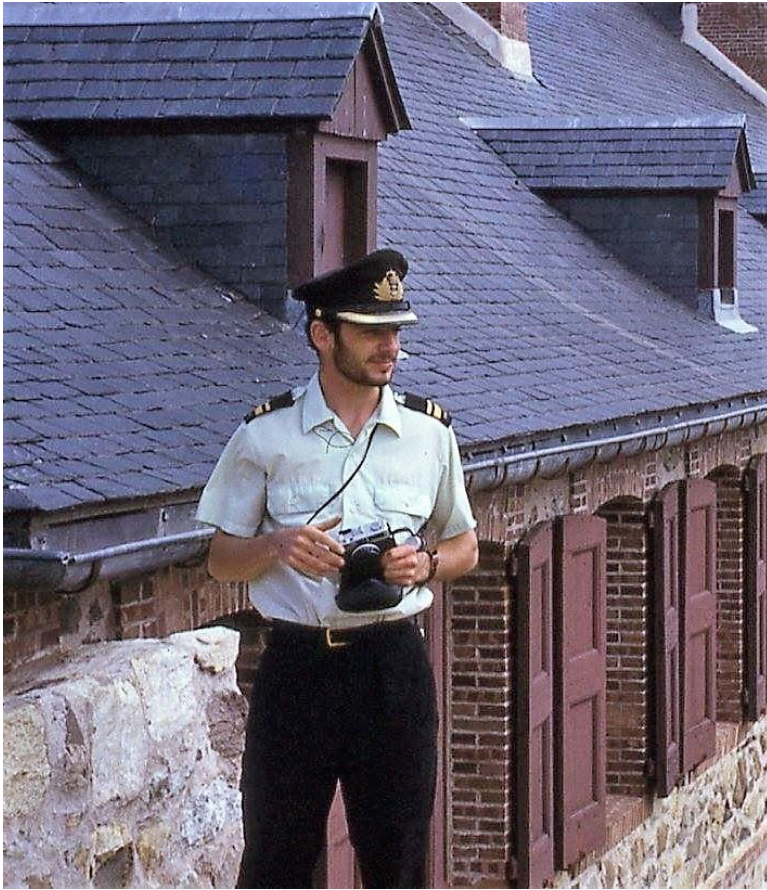


For me, the most rewarding aspect of being active in astronomy has been the opportunity to “share things forward.” Over the past 30 years I have delivered introductory-level programs to schools and service groups of all description both locally and farther afield, written an astronomy column for Ottawa Outdoors magazine, and served as a member of the Canada Science and Technology Museum’s astronomy education team for 16 years. My last formal programs were a couple of fun astro-sketching workshops that I conducted for RASC London and RASC Ottawa in 2019 before Covid shut things down, but I still never miss an opportunity to point out the planets to passersby.

I grew up in a Royal Canadian Air Force family, and it was my dad (97, and living in Montreal) who took us of out into the dewy grass of our Rockcliffe backyard in our pyjamas in the summer of 1958 to watch one of the early satellites pass overhead. I was five years old. Another decade would pass before I received my first real telescope for Christmas, *while Apollo 8 was doing its thing at the Moon!*



In the early 1970s, I abandoned university in Montreal to navigate my way across the oceans with the Canadian Navy, at times using nothing more than the stars and a sextant to fix the ship’s position on an otherwise empty sea. It was hugely satisfying. I still remember the exhilaration of seeing the slash of light from Comet Kohoutek in an inky black sky night after night as we transited the Panama Canal in early 1974 and worked our destroyer escort up the west coast of North America. It was all part of the amazing adventure I later came to regard as my proper education – my “university of the sea.”



I wore a naval officer's uniform for 25 years, and still work for the RCN today, editing the Navy's *Maritime Engineering Journal* that I helped launch in 1982. Semi-retirement is on the horizon for next year (Freedom 70, baby!). It's time. It really is, as I have much to do. In addition to stage managing community theatre productions and writing plays, there are several novels in the works that require my fuller attention, including a young readers novel that is set – where else – on the Moon!



Having decommissioned my backyard Brightstar Observatory two years ago, I am also in the process of fitting a 5-inch SCT onto a new mount. I'd rather write an essay than try to figure out how to kluge a mechanical thing together, but it's back to my roots with a small telescope, and I'm loving it.



Finally, let me just say that I am very much enjoying our monthly online RASC Ottawa meetings, along with the amazing vibe of cooperation and collaboration that is running wild these days throughout the Ottawa Centre. What a group. The level of sharing and mentorship that is going on these days is out of this world, and herein lies the real benefit of clubbing together under the RASC Ottawa banner. It makes this strange hobby of astronomy so much better for all of us.

Clear skies,
Brian

Brian is so modest to list the many things he has done with Ottawa Centre over the years so here is a partial list of his contributions and achievements. Ed.

Brian McCullough's numbers in a nutshell



(stats courtesy of club secretary Chris Teron)
(Joined RASC 1989 | Life Member)

75 talks at monthly meetings (including 24 as meeting chair)
 31 observation reports
 1992-1995 Councilor
 1994 *AstroNotes* Article of the Year (Triumph in Triangulum)
 1994-1998 *AstroNotes* Editor
 1994-2020 (backyard Brightstar Observatory)
 1996 Messier Certificate
 1997-1998 Vice President
 1998-2014 Astronomy Educator with Canada Science & Technology Museum
 1999-2000 President (Dedicated FLO; SmartScope Millennium Project)
 2001 Observer of the Year (Pluto)
 2006 (August JRASC: Seven Easy Steps to Sketching the Lunar Surface in Real Time)
 2006 Observer of the Year (Series: The 10-minute Moon)
 2007-2008 Meeting Chair (second time around, I believe)
 2009 International Year of Astronomy panelist
 2011 *AstroNotes* Article of the Year (Series: Sailfleet Rubicon)
 2013 National Service Award
 2016 RASC London GA astro-sketching workshop presenter
 2016-2017 RASC Ottawa National Council Representative
 2017 Ottawa General Assembly Organizing Committee Chair
 2019 Presentation of the Year (Apollo 8 – Liftoff of My 50-year Journey to the Moon)
 2021 Asteroid 10059 McCullough

Plus, RASC Ottawa Lunar Observing Coordinator, Astronomy Day Coordinator, etc...

The 2022 Mars Opposition

by Andrea Girones

December is Mars opposition month. That means that this is a wonderful time to observe and photograph Mars. There is also an occultation of Mars by the full moon on the evening of December 7th. Occultation details can be

found in your 2022 Observer's Handbook at pages 162 and 213-216.

What does opposition mean?

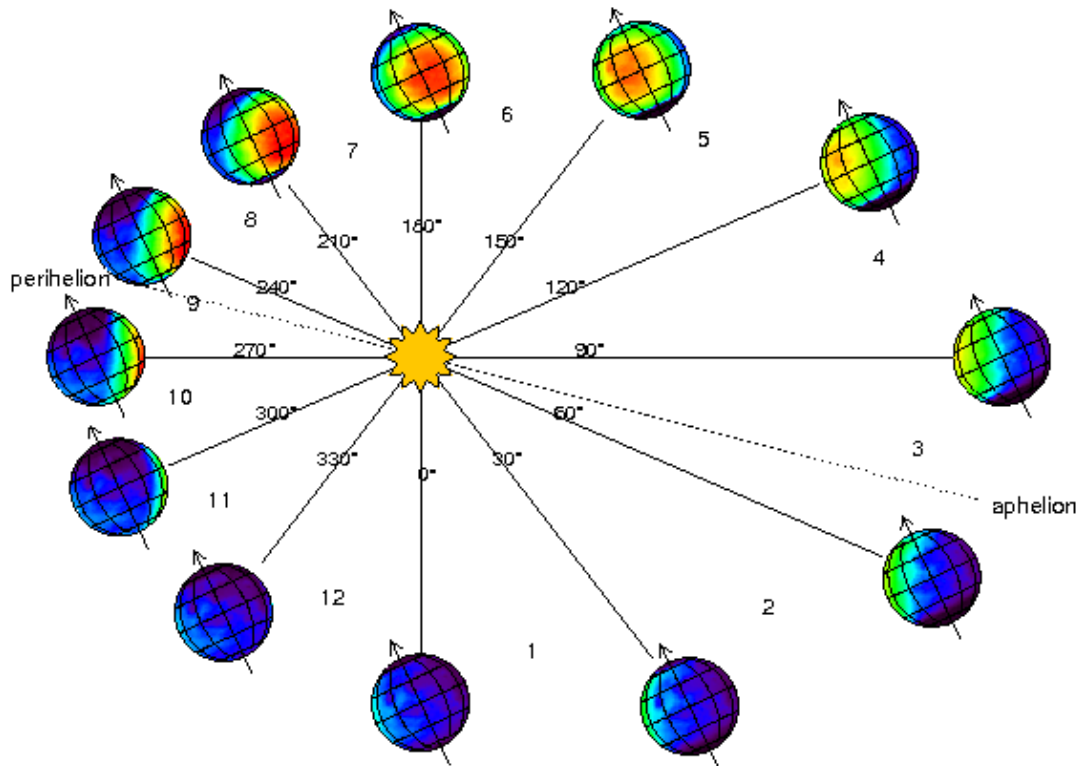
On December 8th, 2022, Mars will be directly opposite from the sun as seen from earth, meaning the whole disk will be fully illuminated and very bright. Similar to a full Moon night, on opposition evening (the 7th) Mars will rise in the east as the sun sets and will set at dawn, so there is a long night to observe Mars. Mars also reaches its closest approach to earth a few days earlier on December 1st, 2022.

Mars at opposition will be big bright and close to earth. It will be 17" (arcseconds) in diameter, which is not quite as big as it was in 2020, when Mars was 24" wide, but still a good size for observing detail. The 2022 apparition is the last

one favourable to northern latitude observers for the next decade or so.

The Martian orbit around the sun is elliptical and described using the solar longitude or LS. By the time you read this Mars will be at LS 350 very close to the Martian spring equinox (LS 1). That means the northern hemisphere winter is over and the planet is slowly warming up. The polar hood or cloud layer to the north was still quite visible at LS 340 (see image above) and we expect the polar hood will soon begin to dissipate and the north polar cap will become visible. We may also see the development of spring dust storms in the northern hemisphere.





Credit http://www-mars.lmd.jussieu.fr/mars/time/solar_longitude.html

How to observe Mars

Planets generally are very small dim targets so using the biggest telescope with the longest focal length possible is recommended. Do spend time during the day to precisely line up the finderscope with the main scope using a faraway tree or building. Start with a wide-angle eyepiece to spot and centre Mars then zoom in, with other eyepieces and maybe a barlow lens. If you have coloured filters they may help increase the contrast and further help identify Martian features.

Planets get very distorted by our atmosphere, so the best viewing time is several hours after sunset when Mars is much higher in the sky. Planets are not really affected by light pollution so you can observe and image Mars during a big moon phase and also from the city. On the actual day of opposition Mars will be quite near the full moon so it might be a bit tricky to observe Mars unless you are planning to view/image the occultation itself.



How to take a picture of Mars (widefield)

Mars is currently nestled near several lovely sky features including the Pleiades, Orion and the Hyades. A DSLR and lens won't be able to pick up a disk or surface features, but the classic orange colour of Mars will definitely stand out in the sky.

For a detailed image of Mars' surface and polar cap you need to use *lucky imaging*, which simply means using a high-speed video/planetary camera, and then later stacking the best 20% or so of the individual frames.

5 tips to obtain a stacked image of Mars

1) Use your largest aperture telescope and align your finderscope

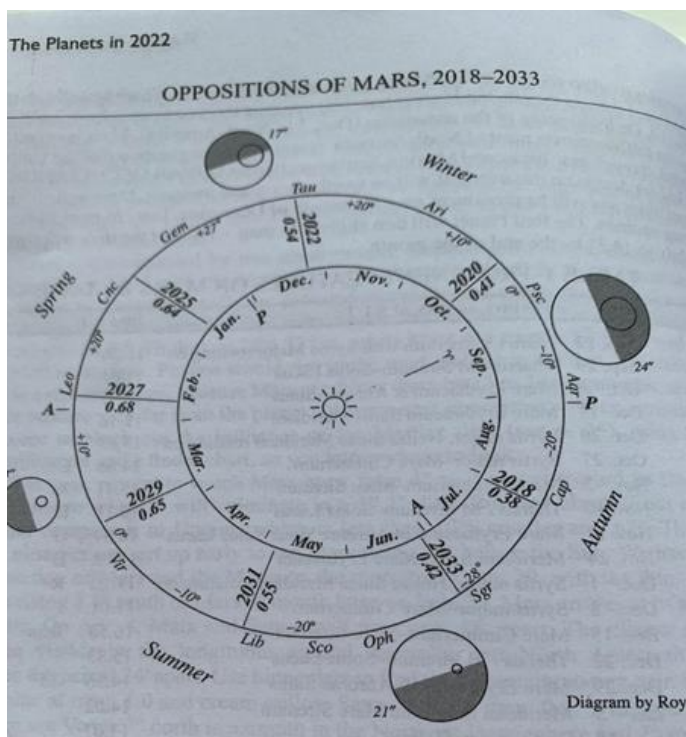
For planets I use an 11-inch Schmidt Cassegrain with a focal length of 2800mm. At that focal length, the piece of sky visible in the eyepiece is tiny. Both a telrad and finderscope are used to track down Mars and it is critical to have Mars perfectly aligned in the finderscope before attaching an eyepiece or camera. A small planet and a small camera sensor make placing the planet on the sensor a very time consuming and finicky task.

2) Image at the highest video frame rate possible- Use a fast camera or crop your big sensor to a smaller image size using acquisition software.

The trick to lucky imaging is a high frame rate. You will find out very fast that your DSLR camera sensor or even your deep sky dedicated astronomy camera sensor is humungous, and your acquisition/download speed is insufficient for lucky imaging. While it is not impossible to use a DSLR, one may need software tools to make a smaller selection of say, 400x400 pixels, to increase the frame rate. Certainly, try taking a video with your DSLR if that is all you have and see how it turns out. It can and has been done by determined photographers.

The easy way to get a high frame rate is to use a fast planetary camera, ideally with a smaller sensor and a USB 3.0 connection. To get even faster speeds many use the "scissors" tool in Firecapture to select a smaller square for acquisition. Firecapture is a free planetary acquisition software tool, and there are many YouTube videos on how to take full advantage of all its useful features for planetary imagers. Other imagers use SharpCap, and the ASIAIR minicomputer now has planetary imaging capabilities.

Another way to increase the frame rate is to shorten the exposure time by increasing the ISO/Gain. Any increase in noise should be eliminated by the planetary stacking process.



3) Shoot your video near opposition

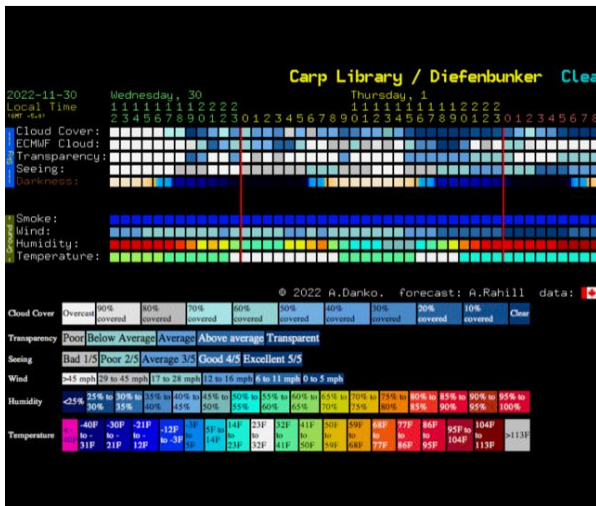
Going back to the Mars opposition this month; the brighter your planet is, the easier it is to expose properly (histogram around 80%) and therefore the faster the frame rates are. Short exposures are critical, so imaging in the weeks before and after opposition is very helpful. If you use a Barlow it is doubly important to image near opposition as a Barlow will darken the image, requiring you to increase the exposure time thereby further reducing the frame rate.

Instead of shooting a long video, shoot several shorter ones and then use Winjupos to derotate the individual stacks. While Mars does not rotate as fast as Jupiter it will rotate enough in a 4-minute video to potentially smear the features. Try taking 5 one-minute videos, stack and sharpen the 5 Mars images, and then go to Winjupos, where you can combine the 5 images into a single derotated image. It is a bit time consuming but well worth the effort.

4) Practice before the big event

Do go out as much as possible in the weeks leading up to opposition. Fine tune all settings for your setup, such as exposure time, gain, max FPS (frames per second) and practice tuning the ADC (atmospheric dispersion corrector) if you have one. Get that polar alignment settled so you can easily track the planet once you find it. This practice will get all the bugs out of the system, and everything will be ready for the big event and/or a night of great seeing when it actually happens (see next tip).

5) Watch for nights of great seeing and do everything you can to image on those nights



I once took a train back early from a conference in Toronto to get to my telescope in time to image Jupiter near opposition on a night of great seeing. Totally worth the change fee!

Watch the charts in Clear Dark Sky, Atmospheric and other apps and if you have practiced (as recommended in tip #4) you will be ready for that great night of Mars imaging when it finally arrives. Seeing is everything and no amount of technique and practice will help an image as much as a night of good seeing. Those nights are rare in Ottawa don't miss them!

Processing your images- all with free software

Once you have your Mars video, you will need to stack in Autostakkert, sharpen in Registax with wavelets and perhaps even derotate in Winjupos. These are all free pieces of software and if you need help with processing feel free to contact me directly at agirones@gironeslaw.com If there is sufficient interest I can document the planetary processing workflow for next month's Astronotes.

Go get Mars!!

Mars resources

Chris Vaughan Skylights. <https://astrogeo.ca/skylights/>

Martian date and time converter http://www-mars.lmd.jussieu.fr/mars/time/martian_time.html

Martian Profiler <https://skyandtelescope.org/observing/interactive-sky-watching-tools/mars-which-side-is-visible/>

Planetary imaging with Firecapture <https://www.youtube.com/watch?v=yDAR3I3u9PA>

The London Astronomer <https://www.thelondonastronomer.com/it-is-rocket-science/2020/9/13/imaging-the-planet-mars>

A Review of RASC's "Observer's Handbook, 2023"

By Paul Sadler

Plot or Premise



The RASC Observer's Handbook is the Royal Astronomical Society of Canada's annual guide to help amateur astronomers with their hobby for the coming year. James Edgar is the editor of the annual edition. In the interest of full disclosure for my review, I am an active member of RASC Canada and have interacted with the editor online infrequently over the last few years.

Review

The guide is an obvious challenge to produce, as the level of the observers who buy it varies so widely. You have newbies who may not even have a telescope yet, but who might get it for Christmas as a gift. If so, they may find it a bit technical. Dry even. It is heavy on info and light on pictures, all black and white except for the gorgeous cover. You have a knowledgeable moderate astronomer who already knows how to do most things and wants lists or tables, a reference guide, and perhaps a few special topics to learn about new aspects. And then there are the hard-core astronomers who could likely write a technical manual on optics, wavelengths, gaseous anomalies, or a whole host of other aspects of space. Some of them want REALLY technical specs on things, and scientific discussions of some of the topics, way beyond the average user.

The handbook is divided into 13 sections and the main interest for me in the review is if the newbie to a moderate user can find useful stuff quickly and easily, and in digestible chunks.

All three groups may benefit from the **Introduction** (pp 1-18) which lists observatories around the world, major star parties, and planetariums. There is also a list of internet resources, although I haven't found the list as helpful as it once was...I would prefer a more curated list that suggests site A or B with details on what you can find there. However, the major bonus in the intro is the section on "Teaching and the Observer's Handbook" by

Lauri Roche who heads up the national outreach committee. While the article is aimed at teachers, a newbie looking to learn could follow the same advice and order suggested.

The next section is entitled **Basic Data** (pp 19-38). It's a good start but the newbie is likely to be turned off by coordinate symbols and terminology, or astronomical precession, but gravitate towards handy sky measures (diagrams that tell you how to hold your hand out in front of you to measure sky distances in degrees — such as your full fist from pinkie knuckle to thumb knuckle at the side being about 10 degrees). The next part of the chapter deals with elements of the solar system, and nothing screams “read me!” like the title “Heliocentric Osculating Orbital Elements for 2023 referred to the Mean Ecliptic and Equinox of J2000.0”. If you accidentally find yourself in an introductory high-school or university physics class test, and you need a cheat sheet for measures and formulas, pp 29-32 have you all set up.

Do you have **Time** (pp 39-48) for the next section? Of course, you do. Personally? I don't. It is dense and technical and while there is some good stuff in there, the average astronomer needs to know about 2% of it. Maybe. They'd benefit from knowing it all, sure. We all would. On the other hand, if it isn't your jam, it WILL serve you quite well as an insomnia cure.

The next section on **Optics and Observing** (pp 49-93) is probably one of the most important topics for people to understand early. It goes through telescope parameters, exit pupils, magnification, dimming effects, night vision, and eyeglasses, all of which basically tell you how well you are going to be able to see something. Every year, I review the sections to see if it is any clearer, no pun intended, and I feel like the eyeglasses section seems to be presented a bit more simply than in past years. Does the average person need all that info or will they use it? Not unless it turns their crank. I'm personally more interested in what it all means, or how you can adjust for some of it. The average user with no particular eye issues, they tend to be right in the middle of the pack with no discernible problem. For those at either end of the spectrum — near-sighted or far-sighted — they probably need a simple paragraph to tell them what to do. Personally, I'd like some discussion of outreach and what to do when the masses come to look through the scope. Applied optical issues, if you will.

There's the default required article on binoculars. I confess I am not a big fan of binoculars as beginner observer instruments. I love the theory, but in practice, I see a lot of people struggle to hold them steady and to coordinate what they are seeing in a way that is enjoyable. I don't know how many times I've seen people hand binos to kids and expect them to suddenly “see the sky” in all its wonder. Instead, most of the time, they say nice things, and most of them are lying their butts off. They can't see anything, and most of them can't even get it to focus let alone hold it still long enough to point in a specific area. And if they have any eye issues? Fuhgeddaboutit. I much prefer to give newbies a scope trained on a specific object and the only thing they have to do is look and adjust the focus for their eyes. However, one failing that I find with a lot of information out there about binos are the models discussed. Some of them start at \$500 and go up to \$2000 as if everyone can afford that price point. That's not a starter price for newbies, that's a price that tells them they can't afford the hobby. Some of the info in the section is out of date, referencing articles from 1998 and 2000 without any obvious realization that the market has changed dramatically. Alan Dyer wrote an article for Sky News in the summer of 2020 that goes through and rates a bunch of big-name entry-level ones that are available at different

price points up to \$300. It is a far superior article and goes through all of the issues in much more accessible terms.

By contrast, the articles on filters, limiting magnitudes, hints for observing Deep Sky objects, and keeping a logbook are quite excellent. Yet then I hit the ones about weather forecasting for astronomy. The big sources are listed, sure, but there is literally nothing about apps to use. 90% of people under the age of 40 would go to an app before they would go to a website URL and no mention of other ways to get the same information. When I get to the last piece — a primer on astrophotography — I was fully expecting a faint reference to anything involving a smartphone. I was pleasantly surprised to see it updated considerably. It's a bit basic for its advice, and maybe undersells what you can do, but it is far better than most advice on AP out there that treats smartphones as barely able to do anything more than an Etch-A-Sketch could do.

The next section is the money shot for the handbook — **The Sky Month by Month** (pp 94-121). If you want to know anything about any of the objects in our solar system for the coming year, this will have it for each month. But this is where it gets a little fuzzy for the handbook. It covers what's happening in the solar system, which is great for everyone, as the book is sold worldwide. Yet that strength may also be a small weakness.

If I'm observing, I would really like to know month by month about everything that is happening that month, not just the solar system objects. I want to know about major constellations or Messier objects that are well-positioned for viewing that month. That wouldn't work everywhere in the world, though, so it isn't included. I feel a little silly quibbling about its absence, but I don't want another list somewhere else, I want an integrated one.

What can I do? I can cross-reference other sections, or other guides, with this list and make my own. Except the Handbook isn't available in an e-format, as the risk of piracy cannibalizing sales is way too high to allow it to be shared electronically given that it is a major source of revenue for the Society. If I could buy an e-version, I absolutely would, and copy and paste the relevant sections with other guides into a monthly guide for my neck of the woods.

There is a long section on **Eclipses** (pp 122-147) and as much as I love the premise, it seems like a lot of real estate for four eclipses where generally all you need to know is WHEN they are and WHERE they are. There's a bunch of extra technical info in there, but for the average user, likely way overkill. Lots of online websites could scratch an itch for that level of detail.

In every handbook, I am happy to see the **Moon** (pp 148-179) having detailed coverage. Too often in my view, guides jump to the planets immediately and overlook the majesty of our moon. My only quibble is the extra real estate spent on lunar occultations. This is where the moon passes in front of a star. Uh-huh. It does that all the time. A solar eclipse isn't exciting because the moon blocked a star, it's because it blocks OUR star, Sol. I don't get the excitement around occultations at all. Planets, maybe. One star in the sky? Not so much. Personally? I'd love a quick overview of what is good to see on each day of the moon's cycles. This rille or that crater, for example. It would be rather static, but we have observer programs for the moon with almost none of the content from it livening up the section in the handbook to spark some passion.

The **Sun** rises for the next section (pp 180-206). I find it amusing that the section takes up less space than the moon, although I have no idea why I would think it should be longer. Most of us can't view the sun without additional tools, some users can find it static and boring, and well, many of us are night owls. I do find it interesting that there are details on the ephemeris for the sun, yet no info on it for the moon (the point on the horizon at which either one rises or sets, totally dependent on your PoV and location — but incredibly useful for knowing where to aim your camera or scope before they rise, and to position yourself accordingly so that there isn't a tree blocking your view!). There are some really good apps to tell you both.

Planets and satellites [pp 207-236] show up in the next section, followed by **Dwarf and Minor Planets** (pp 237-251), and **Meteors, comets and dust** (pp 252-269). The sections are nothing spectacular, but decent reference materials about what to expect to see or plan to see for each of the areas, and some tables to help with planning. The big items that I think are useful are the cross-references on the planets to which month is good for viewing and similar details for comets.

The next section on **Stars** (pp 270-304) is one where I really want an e-version that I can copy and paste and edit. Some of the lists are available on the website, which is helpful, but it is a weakness of the paper format in some respects. Or if I can't have the eversion, give me an app version that I can click on and filter the list differently.

If I had my true preferences, I'd love to see a Sky at Night portal built into RASC that if you've bought the handbook, or become a member, you get a login and password that would let you go to the site, put in a date range, and it would dump out the info on month-by-month, planets, the sun and moon, and stars, with multiple filter options. I have the guide, but I find myself using online tools far more than the paper book.

And then we come to the last section about **Deep Sky Objects** (pp 305-346). I whined and moaned about some of the other sections being too technical, too dry, and not enough kindling to ignite passions, and then we get some gems in the last section. Info on certificate programs, clusters, the Messier catalogue with seasonal listings, Alan Dyer's guide to the finest NGC objects, challenge objects, wide-field wonders, and bright galaxies, not just ANY galaxy. Lists and mini-observing challenges. Practically a "build-your-own" observing schedule for the year. And they have added Kemble's Fifty-To-The-Pole Program that I had never heard of before this year.

It is exactly this kind of guided approach to a section that some of the other sections would benefit from, in spades at times. Many of the technical sections are feeling tired and worn, and in a need of a refresh as to who the intended audience is for the guide. If we go back to the top of the book review, we're back to that basic challenge — each reader has their own capacity and the range for the Observer's Handbook each year is huge. They literally can't please everyone. I feel like this year's version is less technical, but still not enough of an outreach / learning lens applied to it. Then again, it is meant to be a reference manual. A handbook, not a tutorial.

The Bottom Line

A solid annual guide, although some sections are feeling a bit dated.

Monthly Challenge Objects

By Oscar Echeverri

Observing Challenges

Last Month
Beginner: NGC 7814
Intermediate: NGC 520
Advanced: NGC 7357
Lunar Challenge: Lunar Eclipse



Deep Sky Challenge

Beginner

Messier 2

- Globular cluster in Aquarius
- 6.5 magnitude in brightness
- 16' apparent size



Deep Sky Challenge Intermediate

NGC1333

- A reflection nebula in the constellation Perseus
- 5.6 magnitude in brightness
- 6' x 3' apparent size



Deep Sky Challenge Advanced

Sh 2-224

- Supernova remnant in Auriga
- 20' x 30' apparent size



Lunar Challenge

Crater Vendelinus

- Lunar impact crater near the south east limb of the moon
- 147 km in diameter
- 2.6 km deep



Observing Challenges

Beginner: Messier 2

Intermediate: NGC 1333

Advanced: Sharpless 2-224

Lunar Challenge: Crater Vendelinus



Submitted Images

Richard Taylor



NGC 7814 Little Sombrero Galaxy

The Beginner Challenge object was quite a challenge to find from my Ottawa back yard because it is an area with no very bright stars. However, on 2022-11-20, I tried a new method of computerized star hopping, making use of the free software ASTAP that does plate solving from a downloaded database of stars. It took a couple of tries to get it working (you have to enter specifications of your optical equipment into some obscure sub-menus) but once working, it quickly identified the locations of where I was taking 30s exposures with my ASI178MC camera on the WO Z73 telescope. With that information, I could see where I was relative to the target in Stellarium, then move in just a few hops to the target. So here is the Little Sombrero Galaxy with its prominent dark dust lane cutting it in half. Another name for this galaxy is the Electric Arc Galaxy because the dust lanes look like a couple of carbon electrodes with the core being the brilliant arc between them. To the right of NGC 7814 is the little galaxy IC 5381.



NGC 520 Colliding Galaxies

Once I got the hang of plate solving to assist my star-hopping, I was ready for the Intermediate Challenge, NGC 520. The night of 2022-11-26 was amazingly warm and clear so I had the opportunity to find this object from my back yard. This one took a bit longer to find, but once found, it was just barely visible on the screen in a 30 s exposure. A stack of 84 of these exposures showed a very strange shape for a galaxy - obviously something unusual, but too small to see the details in my small telescope.



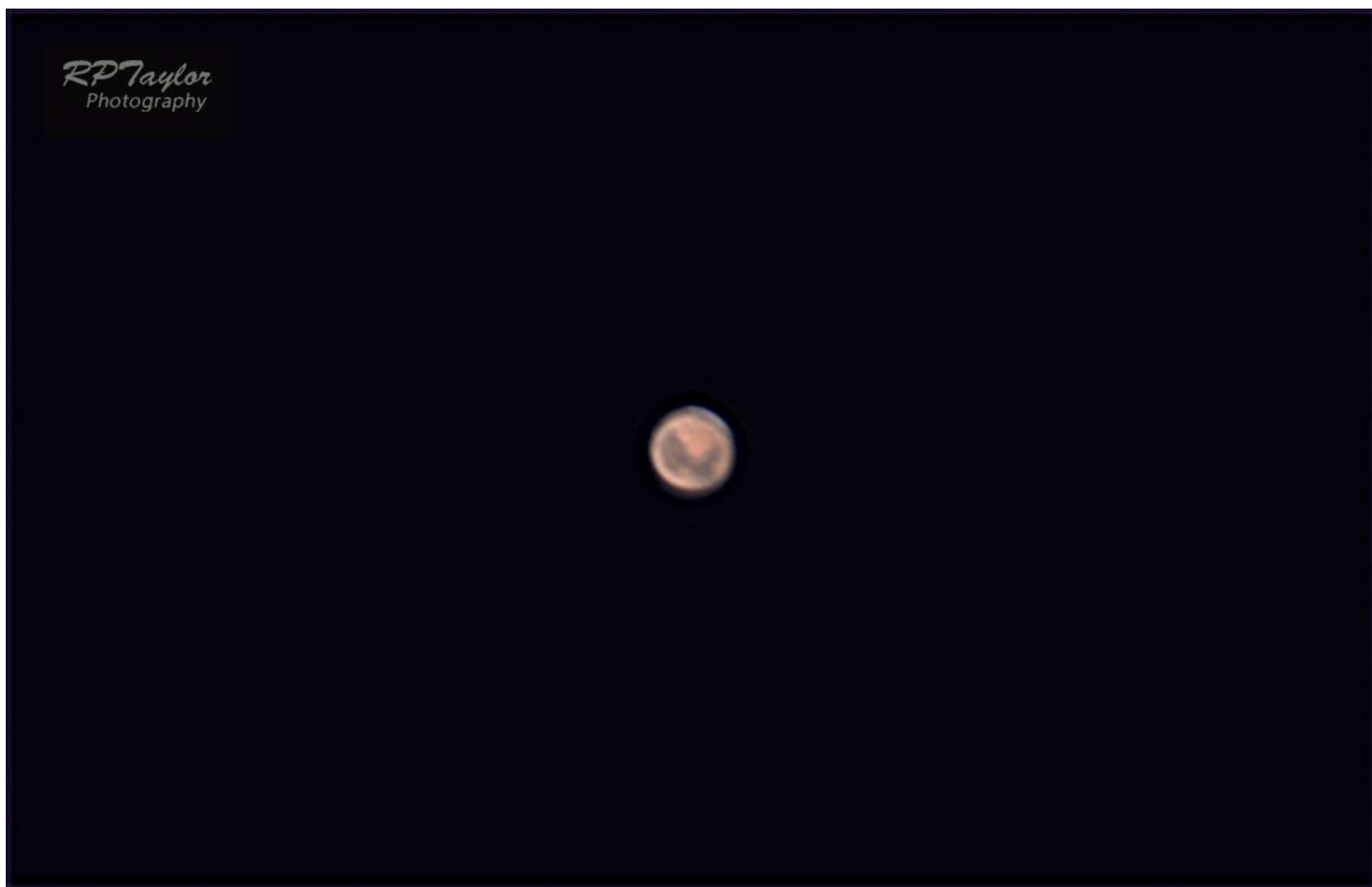
M33 Triangulum Galaxy

Looking for a bigger and brighter target in Stellarium, I noticed that M33, the Triangulum Galaxy was almost due north from NGC 520, so using a few plate-solving star hops, I found this galaxy quite quickly. It was nicely placed overhead, and I spent about an hour and a half taking 30s images. Sadly, a fairly large number had to be discarded due to poor tracking. Time to get a new tracking mount!



M33 combining 2 years

The next day, while processing my pictures of M33, I noticed that I had a similar set of images from last November. However, I think I must have taken those at FLO because I had managed 60s exposures without being overwhelmed by light pollution. This picture is a combination of my pictures from 2021-11-04 and 2022-11-26. Sadly, last year I had the camera oriented about 80 degrees differently from this year, so the combined picture is smaller and crops off some of the farther reaches of the spiral arms.



Mars

I was having so much fun on 2022-11-26 that while my small telescope was taking the pictures of M33, I set up my big telescope to aim at Mars. The eyepiece views were pretty good with some surface details momentarily coming into view, so when the camera was finished with M33, I moved it over and took a couple of 5-minute videos of Mars. Of course, then the clouds came over and spoiled the last couple of minutes! However, by processing the best 5% of the second video, and doing the usual stacking and wavelet sharpening I could definitely make out some interesting surface markings and the polar hood of blue-white clouds.

Oscar Echeverri



The Bubble Nebula - NGC 7635

The Bubble Nebula (catalogued as NGC 7635) is an H II region emission nebula in the constellation Cassiopeia. The “bubble” was created by the stellar wind from the massive, hot central star ASO20575. The nebula is near a giant molecular cloud which contains the expansion of the bubble, while itself being excited by the star. The Bubble Nebula is located 7100 lightyears from earth, measuring 3.7 lightyears in radius, giving it an apparent size of 15 arc-min x 8 arc-min from our perspective on earth.

This image was taken on the night of October 2nd, 2022, using a ZWO ASI533MC Pro through an 8” Celestron EdgeHD. It is composed of 100 x 180s sub exposures, for a total integration time of 5h.



Messier 2

Messier 2 (also designated NGC7089) is a globular cluster in the constellation Aquarius and sits about five degrees north of the star Beta Aquarii. It is one of the largest known globular clusters measuring 87.43 light years in radius. Messier 2 sits about 55,000 light years away from earth, giving it an apparent diameter of 16 arc minutes from our perspective.

This image was taken the night of October 22nd, 2022. It was captured using a ZWO ASI2400MC Pro through an 11" Celestron EdgeHD telescope. It is comprised of 100 45s exposures giving it a total integration of 1h 15m.



Messier 15

Messier 15 (also designated NGC 7078) is a globular cluster in the constellation Pegasus. It has a radius of 88 lightyears and sits at a distance of 35,700 lightyears away giving it an apparent size of 18 arc minutes in diameter. It is one of the most densely packed globular clusters in the milky way, and its core has undergone a contraction known as “core collapse”

This image was taken on the night of October 21st, 2022, through using a ZWO ASI2400MC Pro through an 11” Celestron EdgeHD. It is made up of 109 x 45s exposures for a total integration of 1h 21.75m.

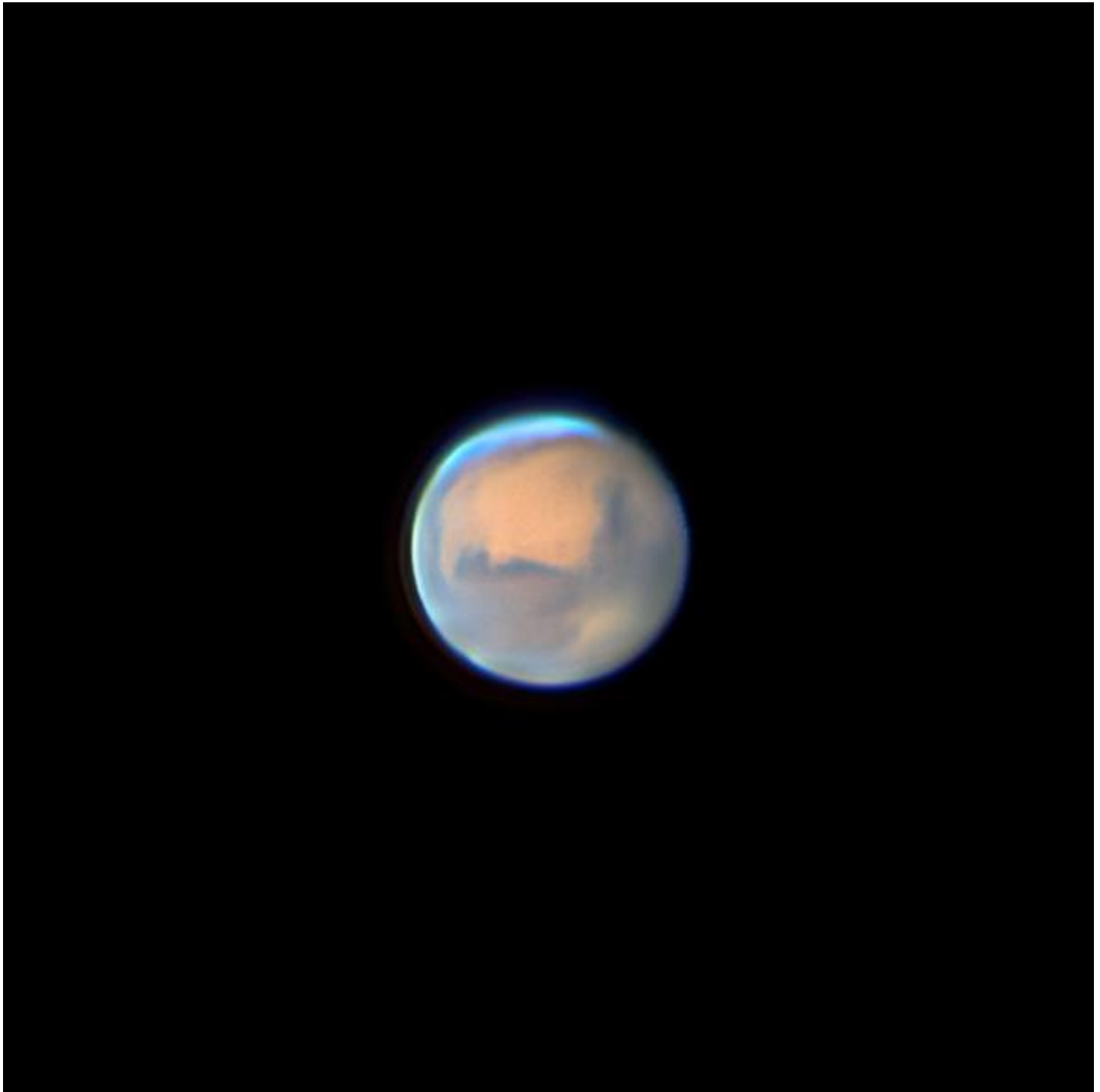


NGC 7814

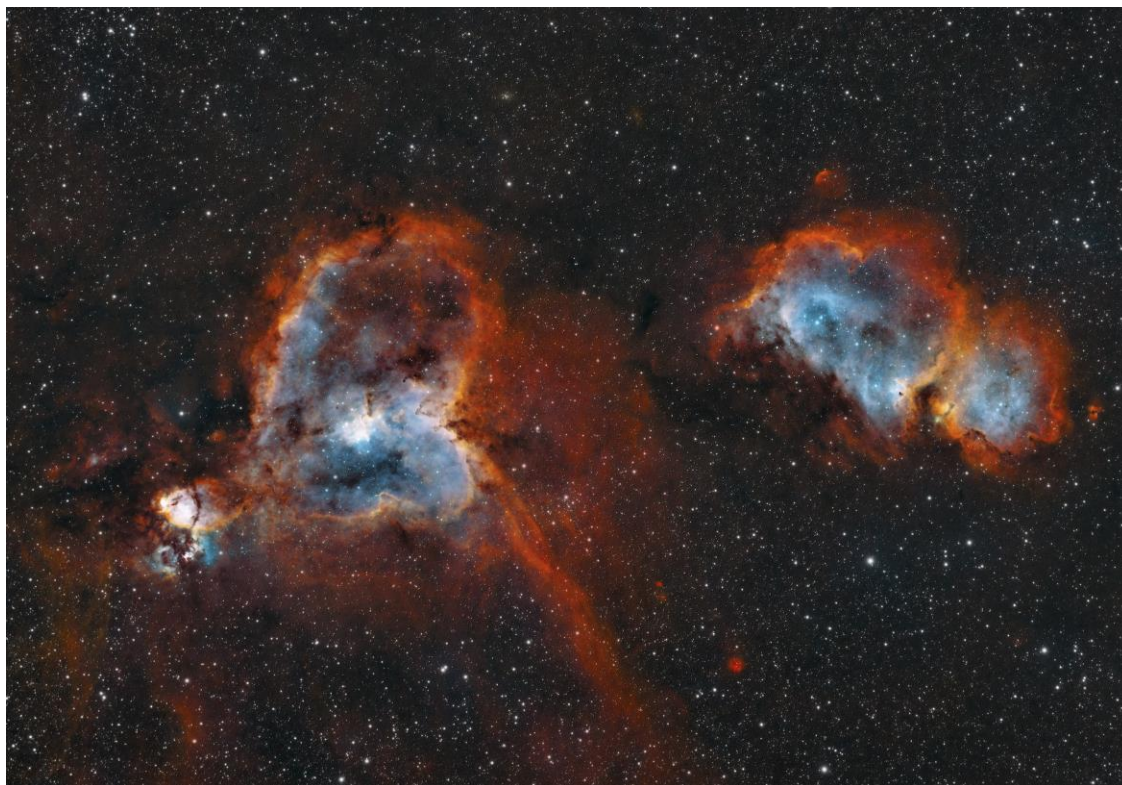
NGC 7814 is a spiral galaxy in the constellation Pegasus. The galaxy is seen edge-on from our perspective here on earth, and its resemblance to Messier 104 (The Sombrero Galaxy) earns it the nickname “The Little Sombrero” since it is a miniature version of the former. NGC 7814 is approximately 40 million lightyears away and is approximately 60,000 lightyears across. It appears to have a size of 9 arc-minutes x 4 arc-minutes.

This image was taken the night of October 28th, 2022, using a ZWO ASI2400MC Pro through an 11” Celestron EdgeHD. It is made up of 93 x 180s sub exposures, for a total integration of 4h 39m.

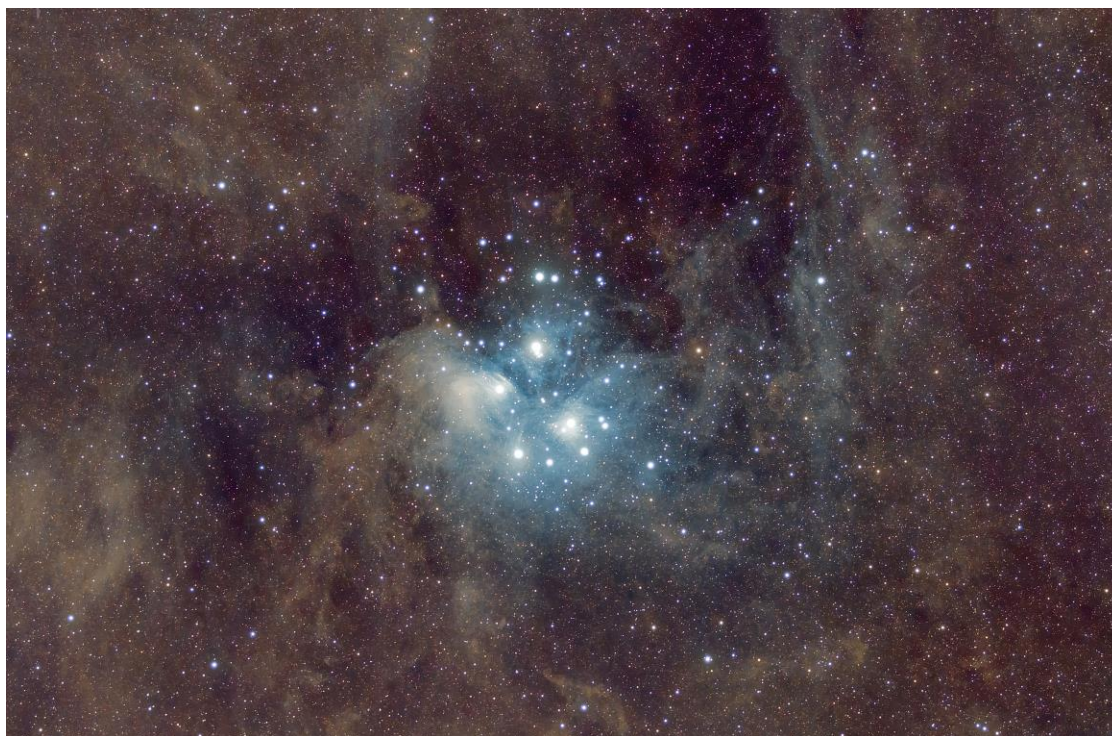
Andrea Girones



Mars



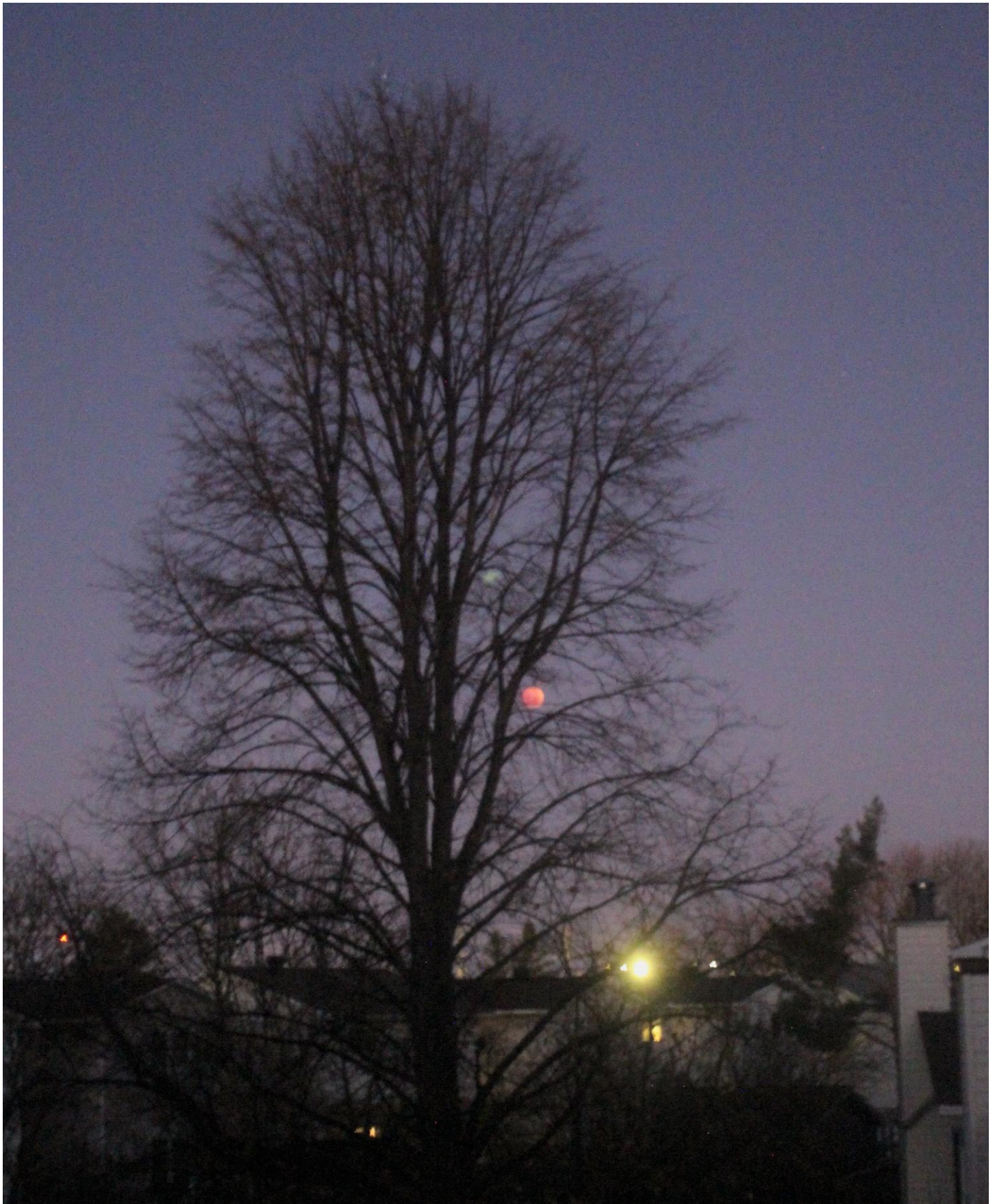
The heart and Soul nebula wide field (180mm Askar lens) with SHO filters and the ASI 2600MM camera



M45 – 9 hours with the ASI 2600MCpro camera.

Brian McCullough











Paul Klauninger



Total lunar eclipse collage_2022-11-08_Paul Klauninger



Lunar eclipse near dawn_Paul Klauninger



Lunar eclipse wide angle near dawn_Paul Klauninger



Moon with iridescent cloud halo_Paul Klauninger



Cryovolcanic eruption on Comet 29P Schwassmann-Wachmann on 2022-11-27_Paul Klauninger

Bob Olson



I presented this image of the crab nebula at last month's meeting. I was contacted by Tony Peterson at which point he told me that he had also imaged the crab nebula 10 years ago in OIII. He wondered if I could also image it in OIII and if we compared our images, we might be able to calculate the speed at which this nebula is expanding away from the centre of its supernova explosion.



This is Tony's 10-year-old OIII image.



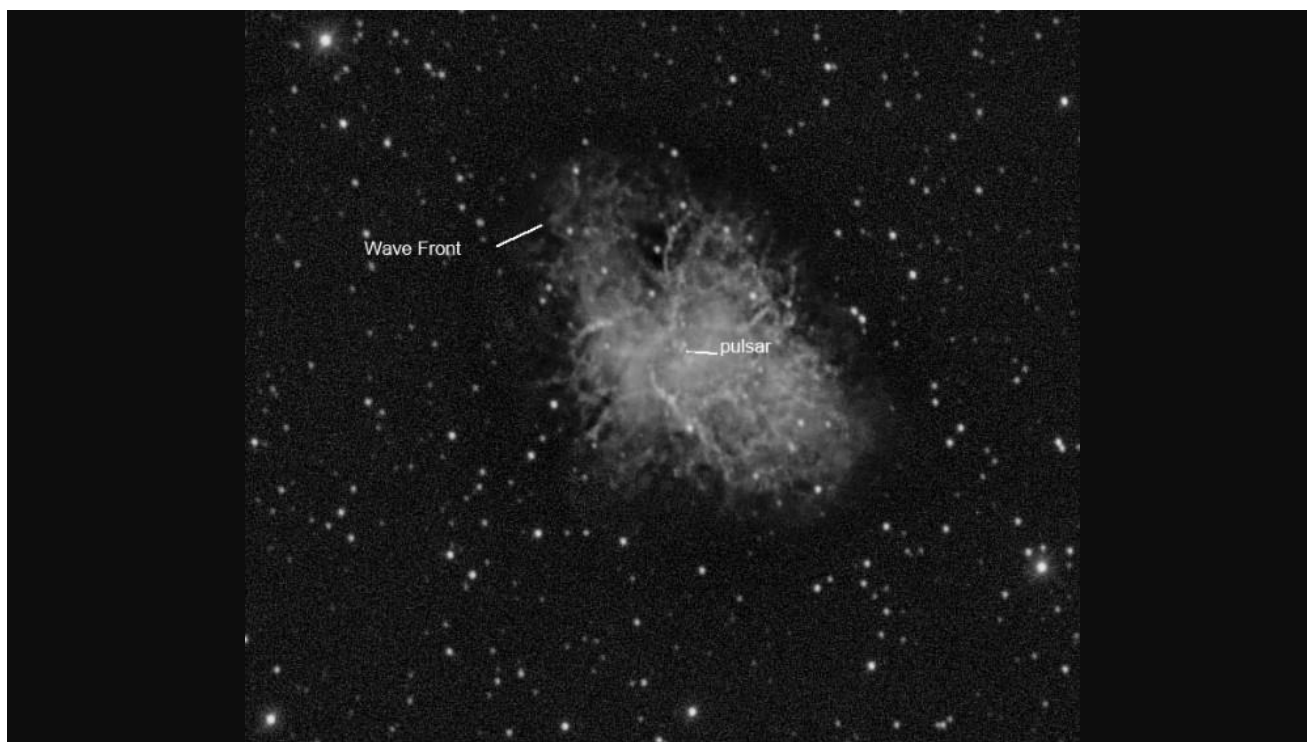
This is my new image also taken in OIII.



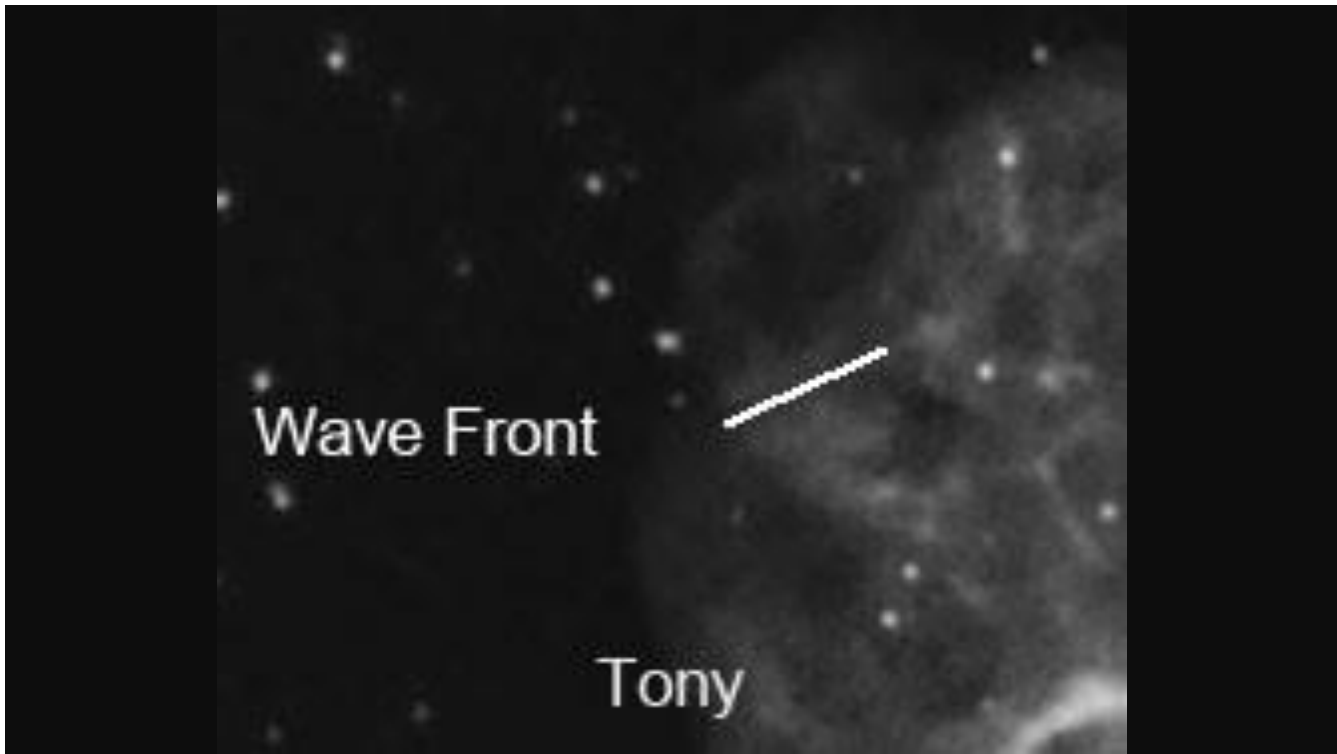
The images are quite similar except Tony used a 10-hour exposure.



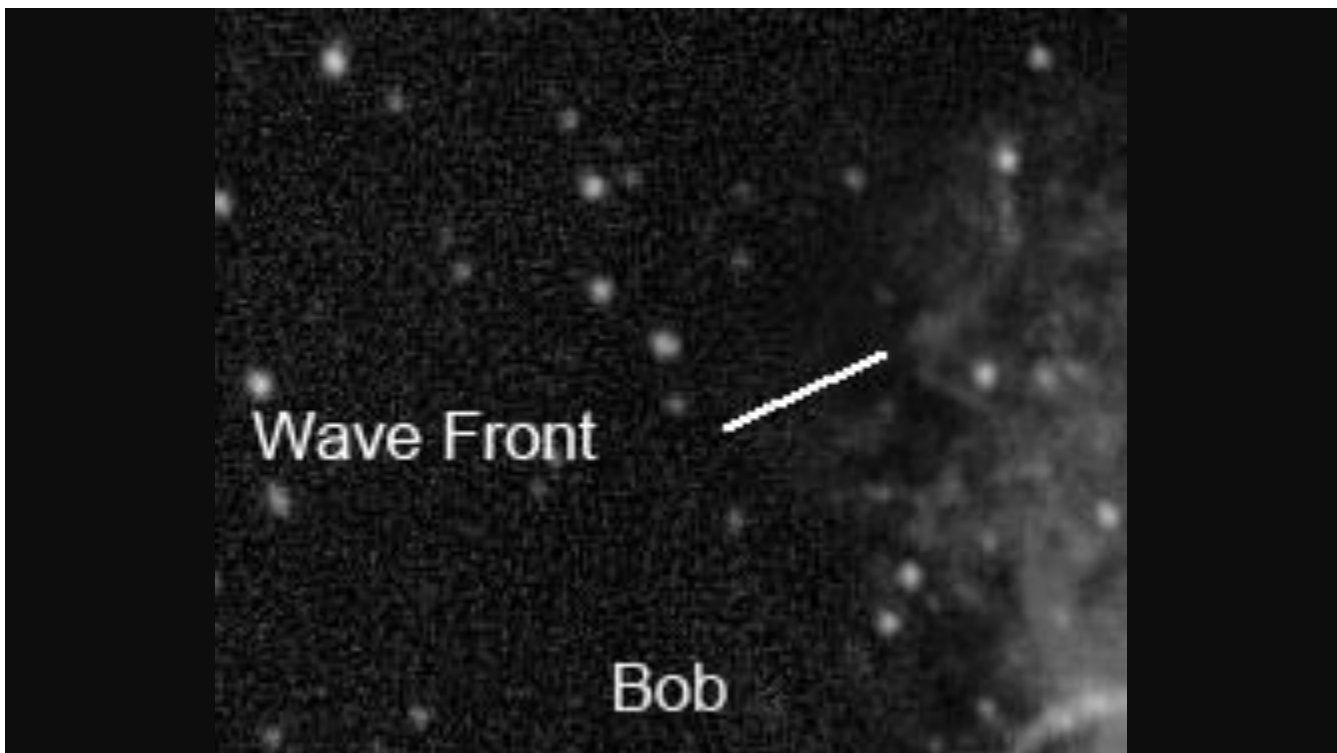
I was only able to squeeze in two hours. There is an obvious difference in how deep the pictures are.



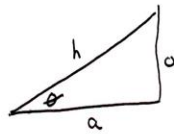
Before I could do any calculations I really needed to know where the central pulsar star was. This is the spot where the original supernova occurred. Then I chose a wave front on the outer edge of the nebula that was in both of our photos. I figured that a feature on the edge would be more likely travelling perpendicular to our line of sight with the nebula.



To calculate the distance, we compared this wave front in our images. Tony's was taken 10 years before mine. The images, especially mine, are blurry enough to make exact measurements tough. But on expanding the images so that the individual pixels showed it appeared to me that the expansion was something between 1.5 and 2 pixels.



$$\begin{aligned}\tan \theta &= \frac{\text{opposite}}{\text{adjacent}} \\ &= \frac{\text{distance moved}}{\text{distance to M1}}\end{aligned}$$



$$\begin{aligned}1 \text{ pixel} &= .95 \text{ arc seconds} \\ &= .0002639 \text{ degrees}\end{aligned}$$

for one pixel

$$\tan \theta = \frac{o}{a}$$

$$\begin{aligned}o &= a \tan \theta \\ &= 6500 \text{ ly} \times \tan(.0002639^\circ) \\ &= .0299 \text{ ly} \\ &= 2.83 \times 10^{11} \text{ km}\end{aligned}$$

$$\text{distance moved} = 2.83 \times 10^{11} \text{ km}$$

$$v = \frac{d}{t} = \frac{2.83 \times 10^{11} \text{ km}}{10(\text{yr}) \times 365(\text{d}) \times 24(\text{h}) \times 3600(\text{s}) \text{ s}}$$

$$v = 897 \text{ km/s}$$

for 1.5 pixels

$$v = 897 \times 1.5 = 1346 \text{ km/s}$$

for 2 pixels

$$v = 897 \times 2 = 1794 \text{ km/s}$$

Once you have figured the expansion between the two images in pixels how do you convert that to its speed. There are all kinds of ways of doing this, but I will show you mine.

I will start with a reminder of the definition of the trig function, tangent. The tangent of a triangle is equal to the opposite side over the adjacent side. In our triangle that is the distant the wavefront moved divided by the distance to the crab nebula.

In my camera each pixel represents .95 arc seconds. That is .0002639°.

So, if the nebula moves one pixel in my camera it has travelled a distance of 2.83×10^{11} km.

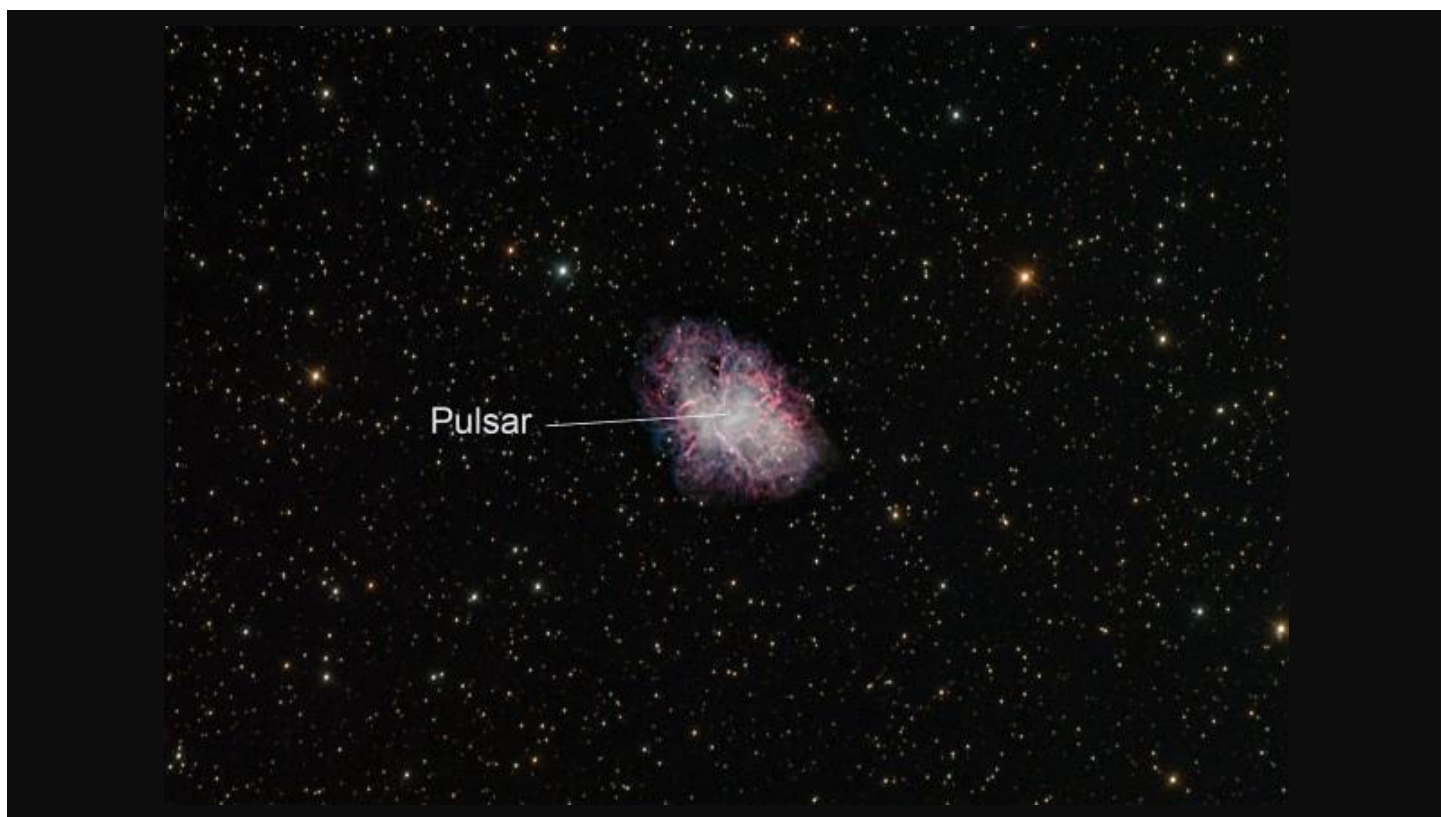
To calculate the speed, we just take the distance moved and divided by 10 years. We need to convert 10 years to seconds which is shown on the slide.

As you can see the nebula moved at a speed of 897 km/s if it crossed one pixel in my camera.

But the nebula moved somewhere between 1.5 and 2 pixels. This works out to a speed of 1346 km/s at 1.5 pixels or a speed of 1794 km/s at 2 pixels.

The accepted value of the speed of the nebula is 1500 km/s. This is right between our two values.

This calculation was a lot of fun and I really appreciate Tony sending me both the suggestion and the data that I needed. He also aligned the images which is the tough part of the analysis.



I really can't leave this image without mentioning a bit more about the pulsar at the centre of this nebula. It is the remnant of the star that exploded in a supernova in the year 1054. It is about 20 km in diameter and has a mass 1.4 times that of our sun. A teaspoon of neutron star material would weigh around a billion tons. It spins 30 times a second and this spin is creating an outflow of wind that generates synchrotron emission. This comes in all wavelengths from radio waves to gamma rays. It is very bright and x-rays.

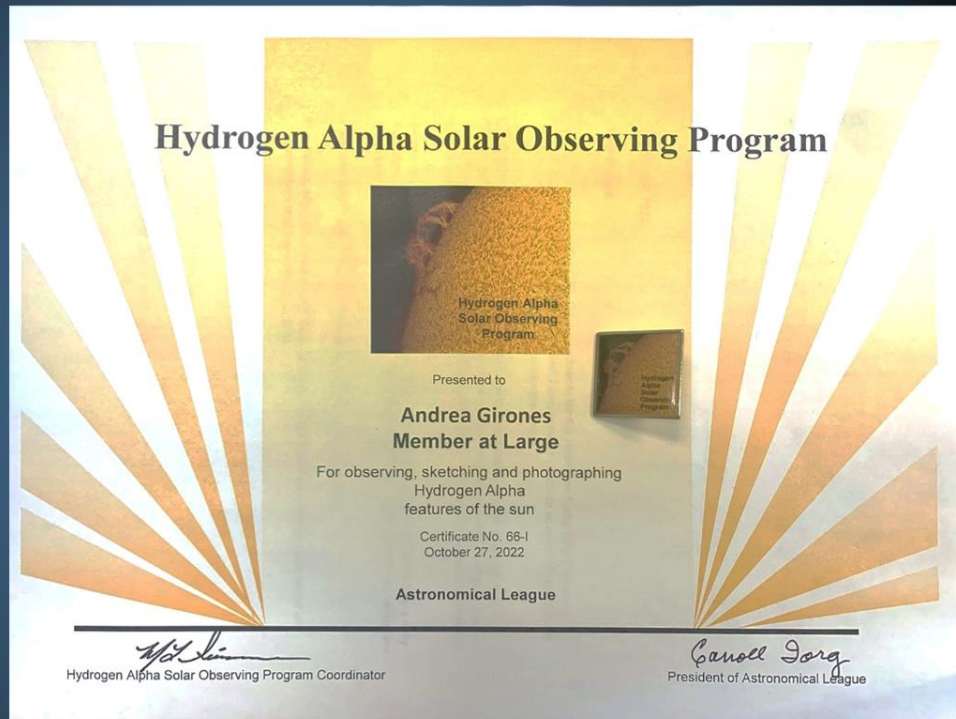
In the 1950's and 1960s the sun's corona was mapped when the sun passed in front of this pulsar. In 2003 the thickness of the atmosphere on Saturn's moon Titan was measured as it blocked x-rays as it passed in front of M1.

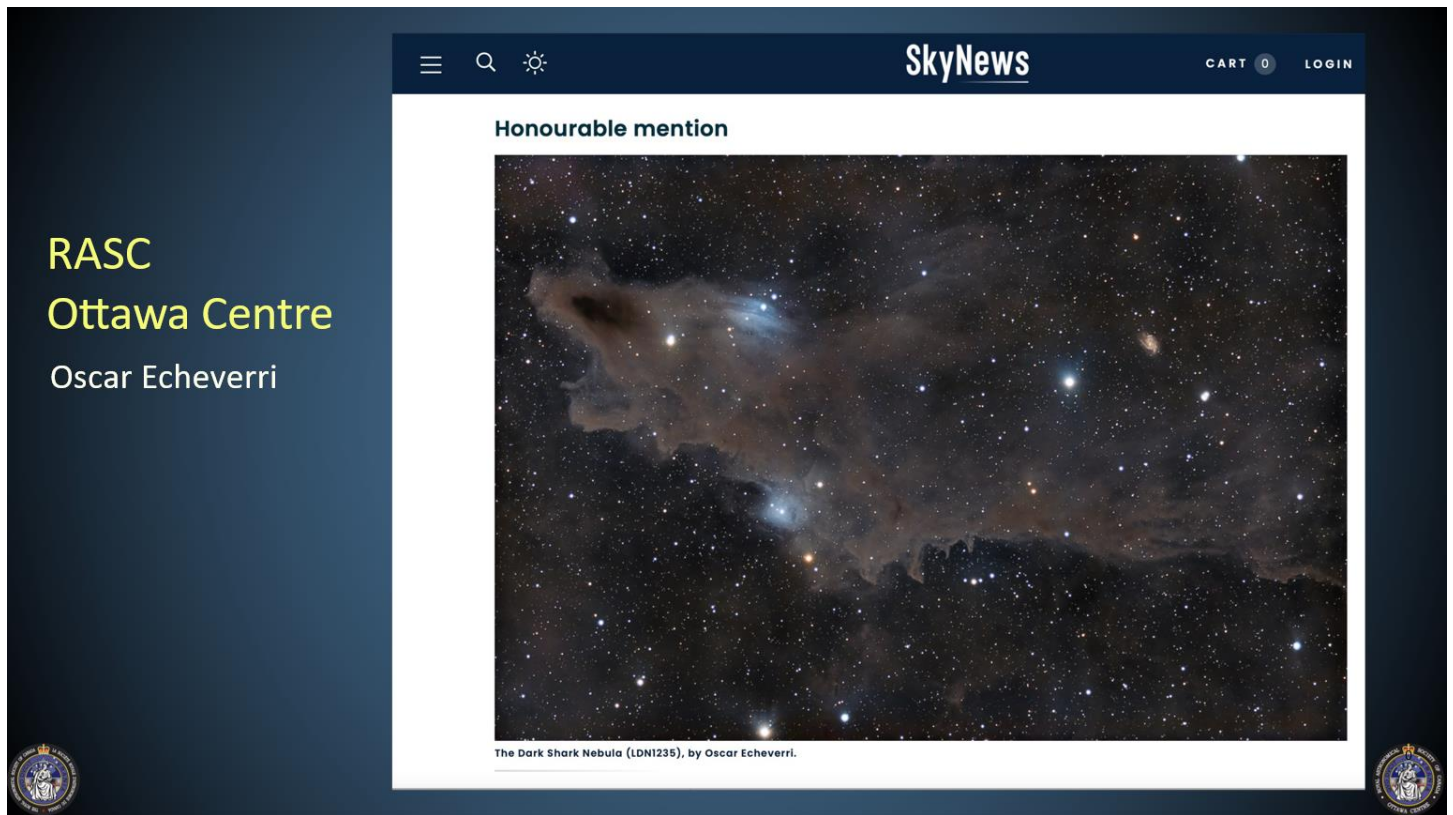
Members in the News

RASC
Ottawa Centre
Dave Anderson



RASC
Ottawa Centre
Andrea Girones





Announcements

Tristan Young, who worked at Focus Scientific serving the astronomical community here in Ottawa for many years, is currently doing an apprenticeship as an electrician.

He will now be supplementing his income by providing the local community with technical work and repairs pertaining to astronomical equipment such as telescope collimation, gear adjustments, bearing service, soldering of replacement power jacks, taking apart and cleaning the optics, etc.

This service will be on a trial basis to insure compatibility with his current schedule.

If interested, contact Tristan at: tryoung@exeverse.com

Public Star Parties

Returning to a parking lot near here April 29th next year.

FLO Star Party Dates for 2022

- ★ Our Ottawa Centre's Members' Star Parties at the FLO will continue this winter. If you haven't attended before, be sure to mark at least one of these dates on your calendar. You are welcome to bring family members or a guest. The GO/NO GO call will be made on the Centre mailing list, about noon the day of the star party.

DATES for the rest of this year and all of next year

- ★ September 24 – Waning Crescent GO
- ★ ~~October 22 – Waning Crescent GO~~
- ★ ~~November 26 – Waxing Crescent 13.7% GO~~
- ★ December 17 - Waning Crescent 33%
- ★ January 21 – New Moon .3%
- ★ February 18 – Waning Crescent 2.4%
- ★ March 18 – Waning Crescent 10.1%
- ★ April 22 – Waxing Crescent 9.4%
- ★ May 20 – Waxing Crescent 2.2%
- ★ June 17 – Waning Crescent .1%
- ★ July 15 – Waning Crescent 2.9%
- ★ August 19 – Waxing Crescent 11.7%
- ★ September 16 – Waxing Crescent 3.7%
- ★ October 14 – New Moon .1% (Annular Solar Eclipse, Max 2:01PM)
- ★ November 11 – Waxing Crescent 1.8%
- ★ December 9 – Waning Crescent 9.5%

Next Meeting

7:30 PM **Friday, January 6, 2023.** This will be **A VIRTUAL MEETING ON ZOOM.** *Watch for email updates.* Note **there will be no \$4.00 parking fee.** The meeting runs until 9:30 pm

PLUS: all our regular meeting features: Ottawa Skies, Observation Reports and, sadly, no Door Prizes!

All RASC monthly meetings are **free** and open to members and non-members alike. A reminder that refreshments will be available in your fridge for all virtual meetings or at Mick's place where there is, I hear, **FREE BEER.** When we return to in person meetings at the Aviation and Space Museum this will be a wonderful opportunity to meet new friends (and catch up with those old friends you haven't seen in a couple of years) who share a common interest and chat in a relaxed, stimulating, and fun environment. Please join us!

Centre Information

To subscribe (or unsubscribe) to our members-only discussion list (rascottawa@googlegroups.com) please contact secretary@ottawa.rasc.ca.

The Ottawa Centre 2023 Council

President: Dave Chisholm (president@ottawa.rasc.ca)

Vice President: Oscar Echeverri

Secretary: Chris Teron (secretary@ottawa.rasc.ca)

Treasurer: Richard Taylor (treasurer@ottawa.rasc.ca)

Centre Meeting Chair: Mick Wilson (meetingchair@ottawa.rasc.ca)

Councillors: Gerry Shewan, Jim Sofia, Katie Francis

National Council Representatives: Mick Wilson, Johnathan Falbo, **OPEN**

Past President: Stephen Nourse

2023 Appointed Positions (Proposed)

Membership: Art Fraser

Star Parties: Katie Francis (starparties@ottawa.rasc.ca)

Fred Lossing Observatory: Rick Scholes (flo@ottawa.rasc.ca)

Light Pollution Abatement: Andrea Girones (lpa@ottawa.rasc.ca)

Public Outreach Coordinator: Asser ElGindy (outreach@ottawa.rasc.ca)

Hospitality: **OPEN**

Stan Mott Astronomy Library: Estelle Rother (librarian@ottawa.rasc.ca)

Ted Bean Telescope Library: **OPEN** (telescopelibrary@ottawa.rasc.ca)

Webmaster: Mick Wilson (webmaster@ottawa.rasc.ca)

AstroNotes Editors: Gordon Webster & Douglas Fleming (astronotes@ottawa.rasc.ca)