Newsletter of the Royal Astronomical Society of Canada Winnipeg Centre March / April 2022

Winnicentrics

The Royal Astronomical Society of Canada - Winnipeg Centre

Upcoming Events

RASC Winnipeg Centre Monthly Meetings (via Zoom)

March 11, 2022
April 8, 2022

Members' Observing Nights

March 12, 2022
April 9, 2022

Oak Hammock Marsh Astronomy Night

Cancelled for telescopes

Regular meetings of the Winnipeg Centre are normally held in the Robert B. Schultz Lecture Theatre in St. John's College at the University of Manitoba, 92 Dysart Road. Free parking is available in the lot across the street. The theatre is on the lower (basement) floor of the College. Meetings are usually held on the second Friday of each month from 7 p.m. to 10 p.m. After the meetings, members who wish to do so usually retire for pizza and more conversation about astronomical subjects.

However, due to the current restrictions imposed by Manitoba Health for the COVID-19 Pandemic all meetings are being held via Zoom at 7:30 PM on regular meeting nights as above. Regular meetings will resume once restrictions are eliminated and our members can meet in safety. We miss you!

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YouTube https://bit.ly/2FrcZJZ

https://bit.ly/3iSmFed

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Gord Tulloch

Winnicentrics is published six times or more each year by the Winnipeg Centre, RASC. Winnicentrics is produced by and for the members of the Winnipeg Centre.
Any opinions expressed are those of the author. Any questions or comments please email: newsletter@winnipeg.rasc.ca
Or contact one of your Councillors above

Quick Notes

The Glenlea Observatory LX200 / Dome is OPEN. Please contact **observatory@winnipeg.rasc.ca** for current info, assistance, or to request training on the telescope and dome. Glenlea Warm Room and Pad are OPEN but please observe any Public Health requirements in effect.

Members Observing Nights are held the Saturday night after the Monthly meeting (weather permitting) at the observatory.

Member Meetings continue to be virtual due to COVID restrictions, please see your email or the RASC Winnipeg Forums for Zoom information.

Boston Pizza after-meeting social events continue to be virtual due to COVID restrictions, please see your email or the RASC Winnipeg Forums for Zoom information.

Visit our web site at:
www.winnipeg.rasc.ca
Visit our Facebook group at:
www.facebook.com/groups/rascwinnipeg

President's Corner

By Dennis Lyons, RASC Winnipeg Centre President

Hello all,

As I write this update COVID restrictions are being lifted bringing us closer to being able to meet in person regularly. We do not know when the U of M will allow us back but hopefully sooner than later.

This also means the Centre is starting to get requests for outreach. Council is recruiting for a Volunteer Coordinator who would work with a volunteer pool to meet these requests. If you would like to do this, please let myself or one of the Council members know. Council will supply the list of volunteers.

The new Council has met, and I am thankful that a full slate of 12 people is on Council. Judy is working with a team of Council and Centre Members to review our new bylaws for any other changes we may want to make. If you have any suggestions, please pass them onto Judy or any of the other members of the Council. The expectation is that sometime in the fall to present the changes to the membership.

Mark Irvine has been appointed the Chair of the Finance Committee. He will be overseeing the development of Financial Policies and Procedures to be added to the Centre Policy and Procedures Manual. In addition to this the Finance Committee will be looking at our Banking and Insurance Services to ensure we have what is required. If you have an interest in these areas, please contact Mark or a Council member to be added to the Finance Committee.

The Council is also moving forward on recruiting volunteers to implement the Strategic Plan. The Strategic Plan is available on the website in the member's section. Please review it to see where you can volunteer.

The Spruce Woods Star Party is recruiting volunteers. Most positions only require a little of your time but go a long way to making the event a success. Please let Silvia Graca know that you would like to help.

The other volunteer opportunities are Meeting Coordinator, Spring Star Party Coordinator, Explore the Universe Coordinator, Observatory Committee members, Webmaster and we would welcome some new meeting presenters as well.

In support of our Strategic Plan and the Mission and Vision and Values Statement the Council has sent a letter of support to the University of Manitoba for "Bringing Astronomy to Manitoba's Indigenous Youth." The Council has received other requests for outreach and support and is considering all of them. However, we need a corps of volunteers who are willing to support this. Even If you have no experience, please let us know that you are interested so we can pair you with an experienced member and the outreach event can happen. It is fantastic that The RASC Winnipeg Centre is seen as a place to go for Astronomy outreach. The Centre is strong and vibrant and has a role to play in bringing the science and wonder of Astronomy to our neighbours.

Clear Skies,
Dennis Lyons

16 February 2022

Bringing Astronomy to the Manitoba Indigenous Youth

Dear Prof. Safi-Harb,

I am writing this letter to you today to inform you that The Royal Astronomical Society of Canada (RASC) Winnipeg Centre is pleased to support you and others at the University of Manitoba with the project "Bringing Astronomy to the Manitoba Indigenous Youth."

The RASC Winnipeg Centre would be pleased to provide the following supports to this project:

a. Volunteers and telescopes for observing sessions as available,
b. Complimentary copies of the SkyNews Magazine as available,
c. Complimentary copies of other RASC publications as agreed upon,
d. If practical assist the participants in the RASC's Explore the Universe Observing Program,
e. Other areas that may be beneficial to the initiative such as Green Laser Pointer Safety Program.

The RASC Winnipeg Centre believes strongly that this is a great initiative. The Centre has supported some local indigenous observing programs and found there is a great desire there in astronomy. We have also had Wilfred Buck speak to the membership about Indigenous Constellations and night sky stories.

The RASC Winnipeg Centre recently completed a Strategic Plan. This initiative would help us fulfil two of its components: Building stronger relationships with like minded organizations such as the University of Manitoba and Public Outreach. This initiative fully aligns with our Mission, Vision and Values. In particular "We value diversity and strive to create an inclusive environment for anyone with an interest in astronomy."

The University of Manitoba and the RASC Winnipeg Centre have a long history of collaboration in bringing the science of astronomy to the people of Manitoba. We are fully supportive of your initiative and look forward to providing the support listed above to assist you in making the program a success.

Sincerely,

Dennis Lyons
President
The RASC Winnipeg Centre

CC
Dr. Danielle Pahud
The RASC Winnipeg Centre Council

Editor's Message

By Gord Tulloch, RASC Winnipeg Centre

I guess the farmers will be happy with the moisture we will be retaining in the soil after a few years of very dry conditions, although this huge amount of snow we've gotten promises to delay start of the observing season for me until things dry up (unless I want to observe with hip waders!) After a new telescope acquisition in the late Fall that never got first light and lots of new bits and pieces added to my kit I'm hoping to spend a lot of time under the stars this Spring! How about you?

One of the most viewed planets that gives us a show every second year when it reaches opposition is Mars. Opposition occurs with the planet is on the other side of the sky from the Sun (in other words is on the same side of the Sun as we are) and is making it's closest approach to us. Mars is in fact a challenging object because it's quite small most of the time, requiring significant magnification and longer focal lengths to get a good view. So those of us who have indulged in multiple telescopes will be breaking out the long focus Schmidt-Cassegrain and Maksutov-Cassegrain telescopes and putting the short focus refractors away. Combined with a good Barlow lens this is the best way to view the planet in moderate sized telescopes, unless you have a large aperture long focus refractor lying around!

With kind permission from Carl Hergenrother, President of the Association of Lunar and Planetary Observers (ALPO) of which I am also a member (https://alpo -astronomy.org) I am pleased to publish a definitive article on the observation of Mars for the current apparition. Next issue I'm hoping to have similar content relating to the Jovians which are also well placed for observation this summer.

Please pay attention to our various communications channels – spring melting brings spring flooding and with the prodigious snows of this winter, we may have to move quickly to rescue our assets at Glenlea from encroaching floodwaters. Many hands make light work, so please pitch in when the call goes out.

As always, I welcome your submissions to this newsletter with observing reports, DIY projects, equipment reviews and images for the Members Gallery. Your newsletter is only as good as our members make it!

Best wishes for warm weather, clear skies, and dry feet for the Spring!

Upcoming Meetings

March 11 2022 Meeting (Zoom)

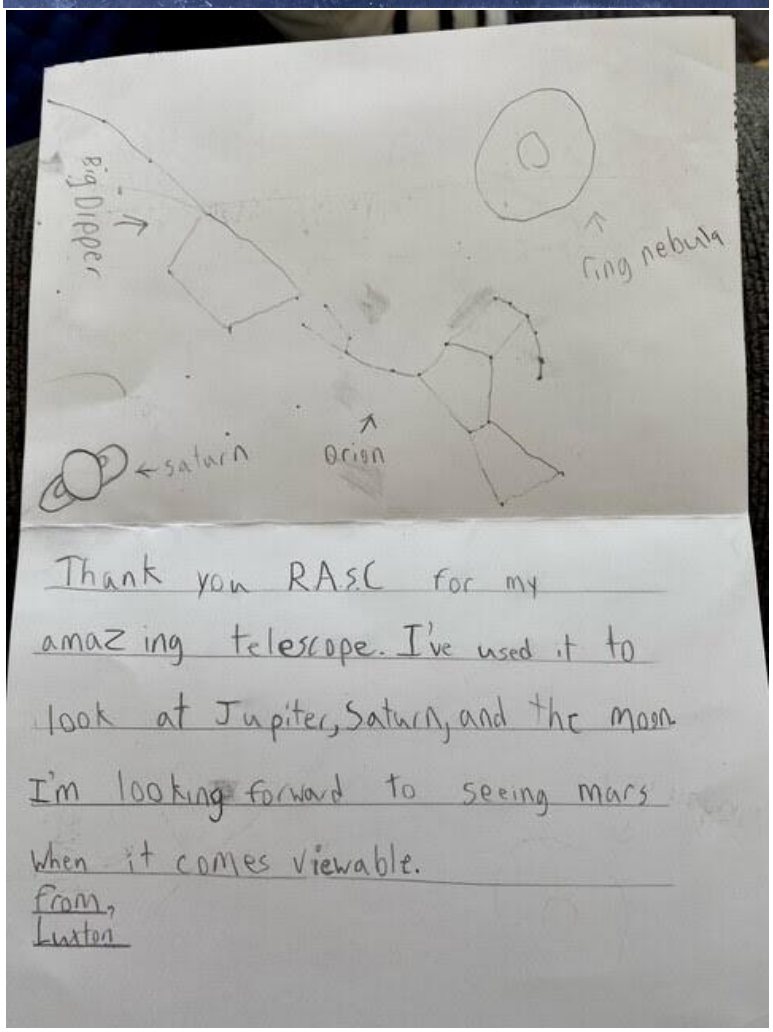
- TBA, Beginner's Session
- Bryan Stach, RASC Winnipeg Centre "Whats Up?"
- Dr. Danielle Pahud, University of Manitoba "What's New?"
- Main Speaker: Dr. Dale Frail – Astronomy in the Antarctic

April 8, 2022 Meeting (Zoom)

- TBA, Beginner's Session
- Bryan Stach, RASC Winnipeg Centre "Whats Up?"
- Dr. Michelle Boyce, University of Manitoba "What's New?"
- Main Speaker: Bill Hood (geocanuck) – Ideas on the Formation of Resistive Polygonal Ridges on Planet Mars

Card from A Telescope Recipient

This month we received a card from Luxton Galbraith, son of RASC member Kyle and a recipient of a 4.5" Orion Starblast telescope and Celestron Zoom eyepiece from Telescopes for Kids this holiday season. It looks like the telescope is already being put to good use!



The 2022-2023 Apparition Of Mars

By Jeffrey D. Beish, Association of Lunar and Planetary Observers (30-June-2021)

Permission to republish this work is hereby granted by the Assn of Lunar & Planetary Observers.

Introduction

Mars appears more Earth-like to us than most of the other planets because we can observe its surface, atmospheric clouds and hazes, and its brilliant white polar caps. The latter are composed of frozen CO_2 and underlying water ice, and wax and wane during the Martian year. These aspects, along with the changing seasons and the possibility of life, have made Mars one of the most studied planets in our solar system.

The Red Planet Mars offers both casual and serious observers many challenges and delights, as well as providing astronomers a laboratory to study another planet's atmosphere and surface. Some Martian features even appear to shift position around the surface over extended periods of time. There are several cooperating international Mars observing programs under way to assist both professional and amateur astronomers. These include the International Mars Patrol (I.M.P.) coordinated by the Mars Section of the Association of Lunar and Planetary Observers (A.L.P.O) and the Terrestrial Planets Section of the British Astronomical Association (B.A.A.). Information for observing Mars during a typical apparition is presented in a separate report titled, General Information for Apparitions of Mars. Also, you can find gobs of information at this site.

With the advent of modern CCD camera technology the amateur can produce useful images of Mars when it is as small as ***3.5 arcsec*** . Early in an apparition, Mars rises in the east or morning sky and sets with the rotation of the Earth in the western or evening sky. During the past few apparitions (2001-2018), observers began to take CCD images when Mars was only 30 degrees away from the Sun. Since Mars was only a visual magnitude of ~1.8 then the planet would have been difficult to locate bright twilight hours.

In the pre-apparition reports the observer will find the motion of Mars in our sky, the characteristics for that particular apparition, information pertaining to the polar cap(s) and any special events that may be seen during that particular apparition. As usual a calendar of events will be included with each report that contains cardinal dates for seasonal activity and orbital information of Mars.

Motion of Mars in our Sky

As a general rule, an "apparition" begins when a planet emerges from the glare of the Sun shortly after conjunction. Mars will be in conjunction with the Sun on October 08, 2021 (109.7° Ls); however, it will not be safe to observe Mars until after November 14, 2021 when it is at least 12 degrees away from the glare of the Sun.

The apparent declination of Mars begins at -22.5° in early January 2022 the constellation ***Ophiuchus*** and will descend south into the constellation **Sagittarius,** on January 20th, into *Capriconus* on March 6th, then into **Aquarius** on April 12th, and *Pisces* on May 20th until July 10, 2022. After that Mars will be positioned within ***Aries*** until August 10th when it moves into ***Taurus*** . Mars will be south of the celestial equator throughout the apparition until May 30, 2022 and begin climbing north of the celestial equator

The 2022-2023 Apparition Of Mars (cont.)

the next day. This is good news for those observing in the Northern Hemispheres because Mars will be seen high in their sky. Mars will be above the celestial equator until August 31, 2023.

By May 11, 2022, an '0.8' visual magnitude Mars will be seen rising early in the morning sky in the constellation ***Aquarius*** and by August 27, 2022 will be at western quadrature with the phase defect or terminator of 45.7°. **NOTE:** The Solar Elongation for Mars is the angle between the lines of sight from Earth to the Sun and from Earth to Mars. When these lines of sight form a right triangle then Mars is at quadrature (eastern or western). For detailed definitions and graphics for the motion of Mars in our sky see these excellent web sites: Planetary Aspects and Elongations and Configurations.

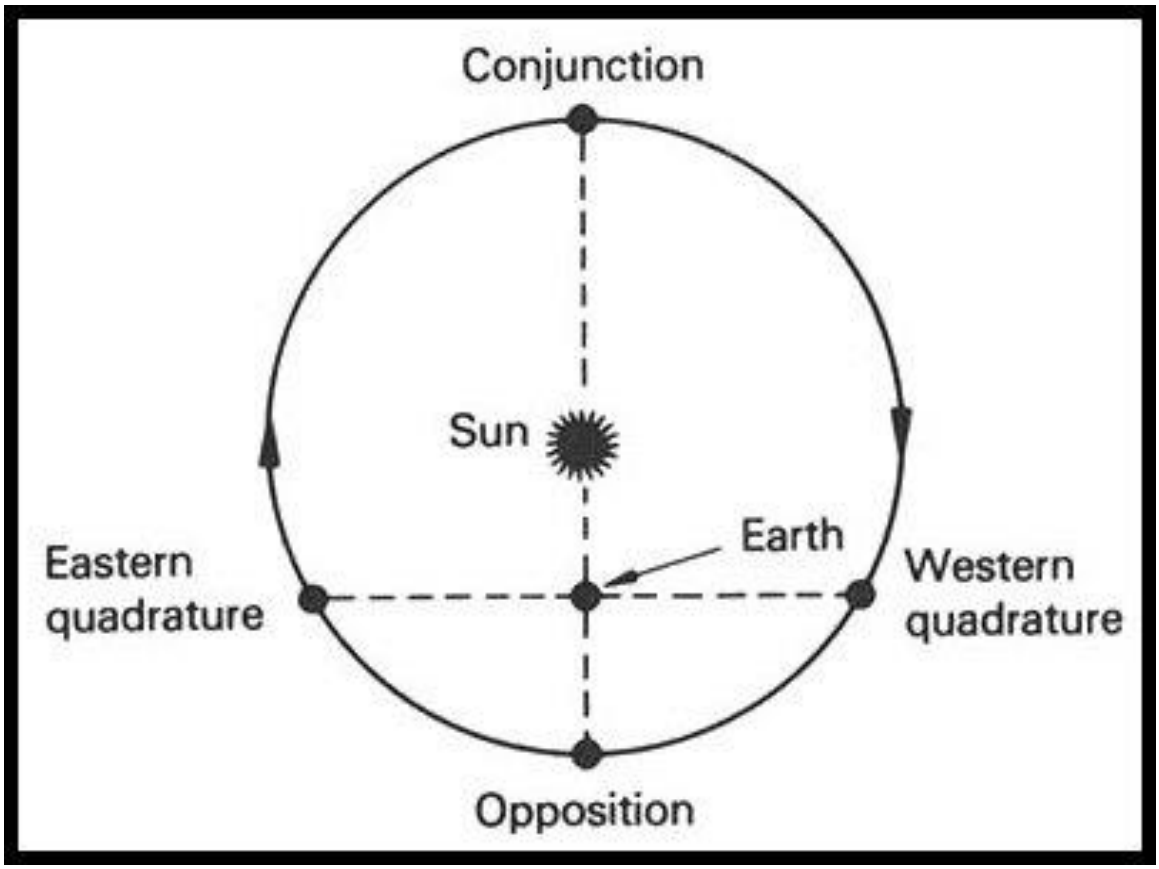


Figure 1. A heliographic chart of the orbits of Mars and the Earth showing the relative positions of both planets. Quadrature is when Mars is directly east or west of Earth as shown.

The 2022-2023 apparition of Mars begins retrogression, or retrograde motion against the background stars eleven months after conjunction on October 30, 2022 (330° Ls) and continues through January 12, 2023 (8.2° Ls). Each night for this brief period of time; before, during and after opposition the Red Planet will appear to move backwards toward the western sky in the ***Taurus*** . Since the Martian year is about 687 Earth days long -- nearly twice as long as ours, the Martian seasons are similarly extended.

The 2022-2023 Apparition Of Mars (cont.)

While the Earth's seasons are nearly equal in duration, the Martian seasons can vary by as much as 52 days from each other due to that planet's greater orbital eccentricity (see Figure 2).

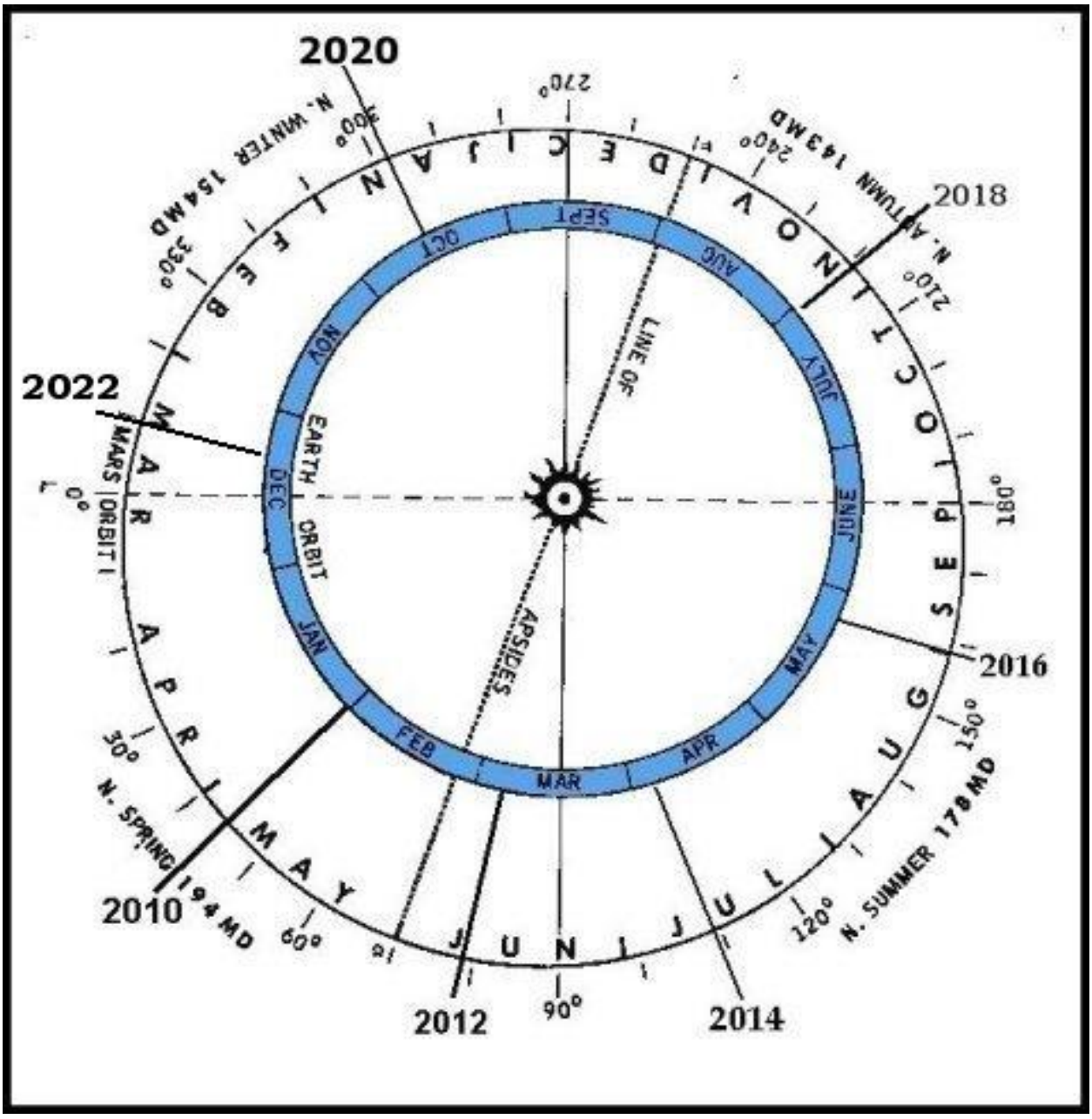


Figure 2. A heliographic chart of the orbits of Mars and the Earth showing the relative seasons of both planets in the planetocentric longitude system Ls. Graphic Ephemeris for the 2020 Perihelic Apparition of Mars. Original graph prepared by C.F. Capen and modified by J.D. Beish.

The 2022-2023 Apparition Of Mars (cont.)

2022 Apparition Characteristics

Another general rule for predicting oppositions of Mars is from the following: the planet has an approximate 15.8-year periodic opposition cycle, which consists of three or four ***Aphelic*** oppositions and three consecutive ***Perihelic*** oppositions. Perihelic oppositions are also called "favorable" because the Earth and Mars come closest to each other on those occasions. We sometimes refer to this as the seven Martian synodic periods. This cycle is repeated every 79 years (± 4 to 5 days) and, if one were to live long enough, one would see this cycle nearly replicated in approximately 284 years. The 2022 Mars apparition is considered ***Transitional*** (between Aphelic and Perihelic) because the orbital longitude at opposition will be 79.3° from the aphelion longitude of 70° Ls and 100.7° Ls from perihelion (250° Ls).

NOTE: Ls is the planetocentric longitude of the Sun along the ecliptic of Mars' sky. 0° Ls is defined as that point where the Sun crosses the Martian celestial equator from south to north, that is the planet's northern hemisphere vernal equinox. The other Ls values that define the beginnings of Martian northern hemisphere seasons are: summer, 90° Ls; autumn, 180° Ls; and winter, 270° Ls. For Mars' southern hemisphere these values represent the opposite seasons. Distance (A.U.) - Distance from Earth to Mars in astronomical units, where one (1) A.U. equals 92,955,807.267 miles or 149,597,870.691 km.

Closest approach occurs at 0218 UT on December 01, 2022 (347.1° Ls) with an apparent planetary disk diameter of 17.2'' at a distance of 0.54446547536492 astronomical units (AU) or 50,611,228 mi (81,450,876-km). During closest approach in 2022 the apparent diameter of Mars will be 5.4 arcsec smaller than it was at the same period in 2020; however, it will be 19 degrees higher in the sky – good for observing the Red Planet for observers in the northern and southern hemispheres of Earth. It should also be noted that closest approach between Earth and Mars is not necessarily coincident with the time of opposition but varies by as much as two weeks.

Opposition occurs 14 months after conjunction when Mars is on the opposite side of the Earth from the Sun. At that time, the two planets will lie nearly in a straight line with respect to the Sun, or five weeks after retrogression begins. Opposition will occur at 0536 UT on December 08, 2022 (350.8° Ls) with an apparent planetary disk diameter of 17.1 arcsec. Mars will remain visible for 10 months after opposition and then become lost in the glare of the Sun around October 10, 2023; as it approaches the next conjunction (November 18, 2023). The cycle is complete in 780 Earth days.

The 2022-2023 Apparition Of Mars (cont.)

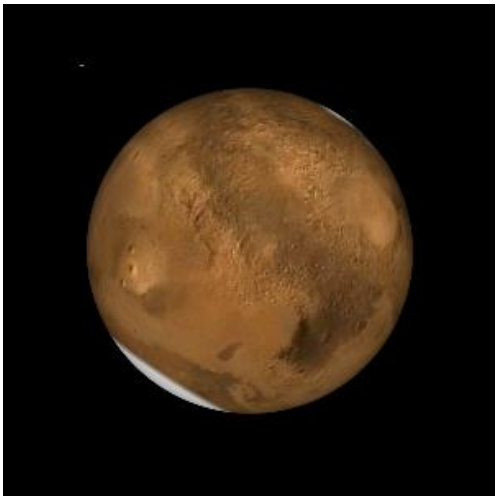


*Figure 3. A simulated view of the appearance of Mars during opposition at 0536 UT on December 08, 2022 (350.8° Ls **, CM 248.9°)***

The observable disk diameter of Mars will be greater than 6 arcsec from May 11, 2022 [-5.6° δ] (225.0° Ls) and will not fall below this value until April 11, 2023 (49.3° Ls), lasting 11 months or 184 degrees Ls. Imaging by CCD devices may begin with a disk diameter of 5 arcsec or more, commencing on or about March 18, 2022.

The Sub-Earth (**De**) and Sub-Solar (**Ds**) points are graphically represented in Figures 4 and 5. The 2022-2023 Ephemeris of Mars is tabulated on Internet in the ALPO web site. A glossary of Terms appears at the end of this table.

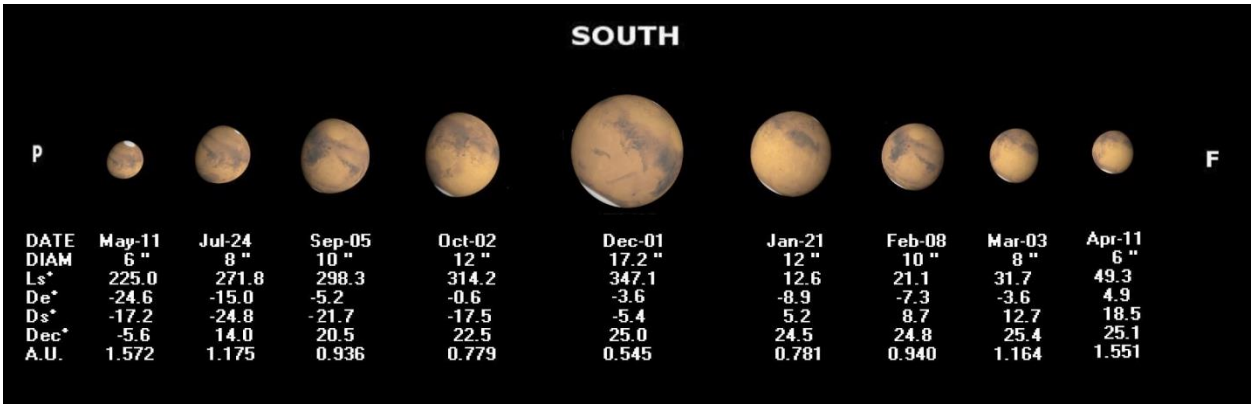


Figure 4. As it approaches Earth, it will swell from a small apparent disk of 6" in May 11, 2022 to a maximum diameter of 17.2" at closest approach on December 01, 2022, and then shrink as it moves away. Images shown at 0h UT.

The 2022-2023 Apparition Of Mars (cont.)

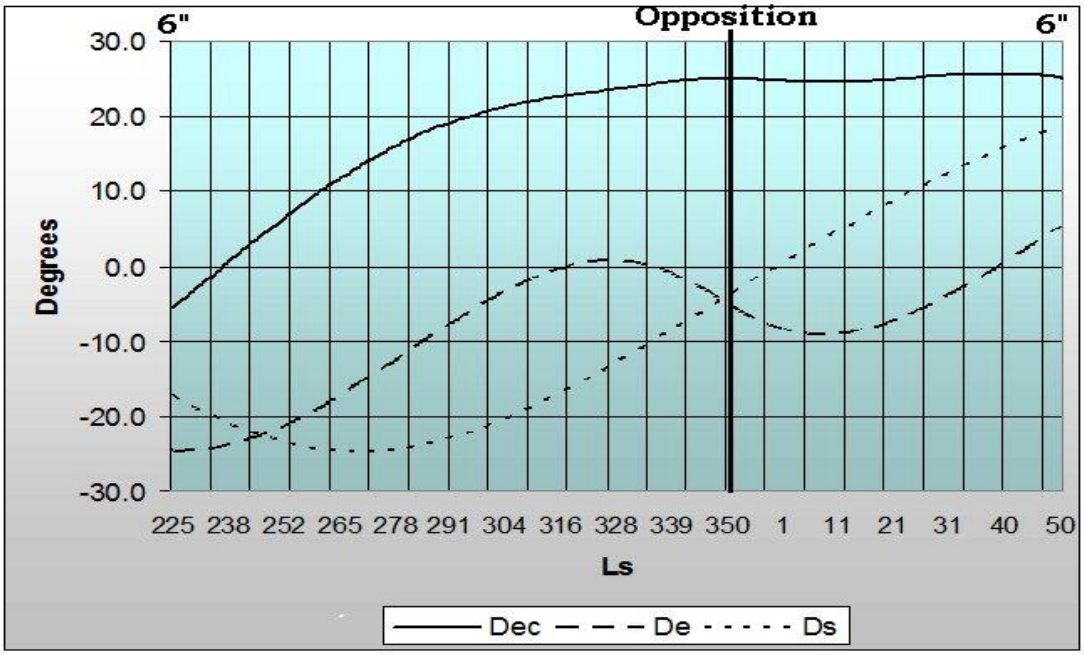


Figure 5. Graphic Ephemeris of Mars during the2022-2023 apparition from May 11, 2022 through April 11, 2023. Opposition (350.7° Ls) and 6 arcsec apparent diameter range are indicated. Plot illustrates the Declination (solid line), the latitude of the Sub-Earth point (De) or the apparent tilt (dashed line) in areocentric degrees, and the latitude of the Sub-Solar point (dotted line) in areocentric degrees. The areocentric longitude (Ls) of the Sun, shown along the bottom edge of the graph defines the Martian seasonal date. The value of Ls is 0° at the vernal equinox of the northern hemisphere, 70° when Mars is at aphelion, and 90° at the summer solstice of the northern hemisphere 251° when Mars is at perihelion, and 180° is northern autumn.

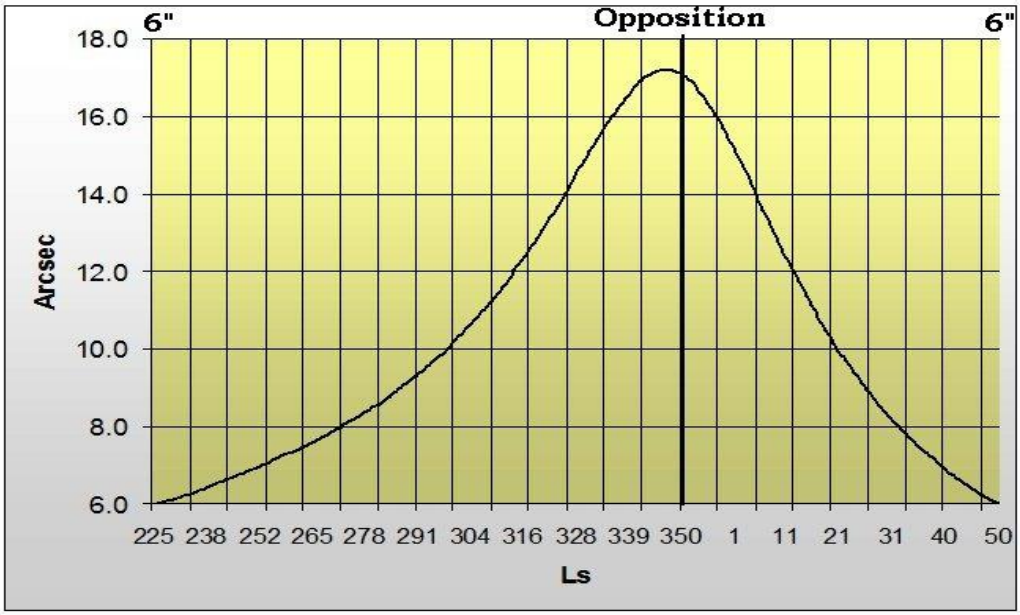


Figure 6. Graphic Ephemeris of Mars from May 11, 2022 through April 11, 2023. Opposition (350.7° Ls) and 6 arcsec apparent diameter range are indicated. Plot illustrates the apparent diameter of Mars in seconds of arc. The areocentric longitude (Ls) of the Sun, shown along the bottom edge of the graph defines the Martian seasonal date.

The 2022-2023 Apparition Of Mars (cont.)

The North And South Polar Regions

Astronomers will have a view of both polar regions during the next apparition. From the second week in May 2022 the Martian South Polar Region (**SPR**) will be positioned to be seen from the Earth and will remain so until February 08, 2023. Also, during the last week of August 2022 the North Polar Region (**NPR**) positioned to be seen from the Earth. For more detailed information on both polar regions click the north polar cap and south polar cap.

Dust Storms

Observers should be aware that massive, planet-encircling storms usually occur in the southern hemisphere summer and in sensitive areas for the development of dust storms are in the south of Acidalium Mare, Chryse, Erythraeum Mare, Ophir and northeast Solis Lacus. While these events are nearly impossible to predict our studies show that the Martian dusty season should be ongoing from the beginning of the apparition through the end with the highest probability around in mid-May (225° Ls) and again peaking on or about October 04, 2022 (315° Ls) often starting in northwest Hellas.

Do not be surprised if another early dust storm occurs on or about January 27, 2022 (184° Ls). When a great dust storm reaches maturity, Mars' disk appears bright orange and Mars' surface features are obscured. For more detailed information on Martian dust storms on this web site.

Special Events

For those interested in catching a glimpse of possible "flares" from the surface of Mars (Edom) there will be a period when it will be possible to be seen when the De and Ds are coincident will be on or about December 05, 2022 (see Figure 7). The last time this event was recorded was during June 07, 2001 when the De = 1.8° and Ds = 2.5° and Mars was situated favorably in the sky for observers to record this rare event. The De and Ds will be very close together in this apparition; however, they will be slightly lower (-4.6° and -4.5° respectively) than in 2001 when the "flares" were seen. Detailed report of the 2001 event (Dobbins, Thomas A. and Sheehan, William (2001), "The Martian-Flares Mystery," Sky and Telescope, Vol. 101, No. 5, May, pp115-123) and "Solving the Martian Flares Mystery," Dobbins and Sheehan, ALPO Web Site. See table below for dates when De - Ds +/- 1.0°:

The 2022-2023 Apparition Of Mars (cont.)

First Period: Di = 17.2" to 17.1"

DATE	RISE	EDOM TRANSIT	DE	DS	DE-DS	i
Dec 03	2243	0915	-4.2	-5.0	0.8	4.6
Dec 04	2237	0951	-4.4	-4.7	0.3	3.7
Dec 05	2231	1027	-4.6	-4.5	-0.1	2.9
Dec 06	2226	1103	-4.9	-4.3	-0.6	2.1
Dec 07	2220	1139	-5.1	-4.1	-1.0	1.6

NOTE: Di = apparent diameter of Mars
De = Declination of Earth from Mars
Ds = Declination of Sun from Mars
De - Ds = coincident
i = phase defect in degrees

Figure 7. Graphic illustration of Mars showing when the possible reoccurrence of Edom flare on 2022-12-05.

The 2022-2023 Apparition Of Mars (cont.)

Calendar of Events -- Mars, 2022-2023

DATE	PHYSICAL	REMARKS
2021 Oct 08	Ls 109.7°	**Conjunction.** Mars is behind the Sun ~2.629 AU.
2022 Feb 24	Ls 180° De -11.8° Ds 0.1° RA 19:37 Dec -22.3° A. Dia 4.6″	Equinox - Northern Autumn/Southern Spring. South Polar Cap (SPC) maximum width. Is the North Polar Hood present. Does SPH or frost cover Hellas? Hellas should begin to clear and darken. Are W-clouds present? South cap emerges from darkness of Winter. SPH thinning and forms "Life Saver Effect?"
2022 May 11	Ls 225.0° De -24.6° Ds -17.2° RA 23:24 Dec -5.6° A.Dia 6″	**Apparition begins** for observers using 4-inch to 8-inch apertures telescopes and up. Begin low-resolution CCD imaging. Views of surface details not well defined. Bright SPC projection Novissima Thyle (300°W - 330°W) areographic longitude. Dark rift Rima Augusta connected from 60° to 270° longitude. Rima Australis visible in SPC (290°-350°W)? W-clouds possible. SPC bright projection Argenteus Mons (10° W - 20° W). SPC Dust clouds in in the south of Acidalium Mare, Chryse, Erythraeum Mare, Ophir and northeast Solis Lacus? SPC ~38° ±8°
2022 Jun 19	Ls 250° De -22.2° Ds -23.5° RA 01:10 Dec 5.9° A.Dia 6.9″	Mars at Perihelion. SPC in rapid retreat. Novus Mons smaller. Dust clouds expected over Serpentis-Hellaspontus (Ls 250° - 270). Syrtis Major beginning to narrow. Frost in bright deserts? Orographic clouds (W-clouds) possible. Elysium and Arisa Mons bright? Note: Several "planet-encircling dust storms have been reported during this season. High probability for dust clouds at 255° Ls. SPC ~ 24° ±4°
2022 Jul 21	Ls 270° De -15.7° Ds -24.8° RA 02:35 Dec 13.4° A.Dia 7.9″	Solstice - Northern Winter/Southern Summer. W-clouds present? NPH extends 50° N? Decreased number of White clouds. "Syrtis Blue Cloud"? White areas in deserts? Dust clouds in south until 270° Ls? Watch for planetary system clouds bands. Orographic cloud over Arsia Mons? Syrtis Major is narrow. SPC ~17° ±2°
2022 Jul 24	Ls 271.8° De -15.0° Ds -24.8° RA 02:43 Dec 14.0° A.Dia 8″	W-clouds present? NPH extends 50° N? Decreased number of White clouds. "Syrtis Blue Cloud"? White areas in deserts? Dust clouds in south until 270° Ls? Watch for planetary system clouds bands. Orographic cloud over Arsia Mons? Syrtis Major is narrow. SPC ~17° ±2°
2022 Aug 27	Ls 292.8° De -7.2° Ds -22.7° RA 04:08 Dec 19.6° A. Dia 9.5″	**Mars at quadrature.** Look for orographic clouds over the Tharsis volcanoes. Orographic cloud over Arsia Mons? W-Cloud? SPC small (SPC ~ 10° ±2°).
2022 Sep 05	Ls 298.3° De -5.2° Ds -21.7° RA 04:28 Dec 20.5° A.Dia 10″	White areas? Orographic clouds over the Tharsis volcanoes. W-Cloud? Orographic cloud over Arsia Mons? SPC very small, difficult to see. SPC ~11° ±1°
2022 Oct 02	Ls 314.2° De – 0.6° Ds -17.5° RA 05:18 Dec 22.5° A.Dia 12″	Edom bright? Is SPC remnant visible in mid-summer? Orographic cloud over Arsia Mons? Topographic cloud over Libya? High probability of dusty storm at 315° Ls. Planet encircling dust storm in November 2020 (308° - 323° Ls)
2022 Oct 30	Ls 330° De 0.8° Ds -12.1° RA 05:41 Dec 23.8° A.Dia 14.9″	**Retrogression Begins.** Hellas Ice-fog activity? Topographic cloud over Libya? Topographic cloud over Edom?
2022 Dec 01	Ls 347.1° De -3.6° Ds -5.4°	**Mars at Closest Approach.** NPC large hood present. W-Cloud? Orographic cloud over Arsia Mons? Topographic cloud over Libya? Topographic cloud

	RA 05:11 Dec 25.9° A.Dia 17.2″	over Edom? Discrete (white) clouds and white areas should be seen. Syrtis Major begins to expand to its east. Topographic cloud over Libya?
2022 Dec 08	Ls 350.7° De -5.1° Ds -3.9° RA 04:59 Dec 25.0° A.Dia 17.1″	**Mars at Opposition.** NPC large hood present. W-Cloud? Orographic cloud over Arsia Mons? Topographic cloud over Libya? Topographic cloud over Edom? Discrete (white) clouds and white areas should be seen. Syrtis Major begins to expand to its east. Topographic cloud over Libya?
2022 Dec 26	Ls 359.8° De -8.2° Ds -0.1° RA 04:32 Dec 24.9° A.Dia 15.4″	**Equinox - Northern Spring/Southern Autumn.** North Polar Hood (NPH) breaking up, North Polar Cap (NPC) should be exposed. ("Areo-" is a prefix often employed when referring to Mars or "Ares.")
2023 Jan 12	Ls 8.2° De -9.3° Ds 3.5° RA 04:23 Dec 24.5° A.Dia 13.2″	**Retrogression Ends.** North Polar Hood (NPH) breaking up and North Polar Cap (NPC) should be exposed. Hellas and Argyre bright? NPC~60° - 65°
2023 Jan 21	Ls 12.6° De -8.9° Ds 5.2° RA 04:25 Dec 24.5° A.Dia 12"	North Polar Hood (NPH) breaking up and North Polar Cap (NPC) should be exposed. Hellas and Argyre bright? NPC~60° - 65°
2023 Feb 08	Ls 21.1° De -7.3° Ds 8.7° RA 04:40 Dec 24.8° A.Dia 10"	NPC nearly static or entering erratic retreat, hood dissipating? Orographic cloud over Apollinaris Petera? NPC~60° - 65°
2023 Mar 03	Ls 31.7 ° De -3.6° Ds 12.7° RA 05:15 Dec 25.4° A.Dia 8″	Limb clouds and hazes should start to increase. Dust clouds in NPR? NPC~60° - 65°
2023 Apr 11	Ls 49.3° De 4.9° Ds 18.5° RA 06:36 Dec 25.1° A.Dia 6″	Continue NPC measurements. Is North Cap fairly static or entering rapid retreat phase. South polar regions becoming difficult to observe. Any signs of South Polar Hood (SPH)? NPC ~68° ±3°
2023 May 28	Ls 70° De 15.5° Ds 13.3° RA 08:27 Dec 20.7° A.Dia 4.8″	Mars at Aphelion. Is North Cap fairly static or entering rapid retreat phase. Watch for "Aphelic Chill" in NPR (usually between 60° and 70° Ls). Antarctic hazes, hood. South polar regions becoming difficult to observe. Any signs of SPH? Cloud activity increases. Are limb arcs increasing in frequency, intensity? NPC ~74° ±1°
2023 Nov 18	Ls 150.2°	**Conjunction.** Mars is behind the Sun ~2.526AU.

The Association of Lunar and Planetary Observers (ALPO) is an international organization devoted to study the Sun, Moon, planets, asteroids, meteors, and comets. Our goals are to stimulate, coordinate, and generally promote the study of these bodies using methods and instruments that are available within the communities of both amateur and professional astronomers. The ALPO collects and analyzes observations of various Solar System bodies and associated phenomena and publishes detailed reports concerning these bodies in its quarterly publication the Journal ALPO, otherwise known as The Strolling Astronomer. Membership in the ALPO includes receiving our Journal. Check out our podcast "Observer's Notebook" on iTunes or your favorite podcast source. Please see http://alpo-astronomy.org for more information!

Printing Eyepiece Cases

By Gord Tulloch, RASC Winnipeg Centre

Eyepieces need cases, but it's expensive to buy a bunch of different sizes for different size eyepieces, particularly for 2" "hand grenade" sized eyepieces like the 18mm TeleVue Nagler and 56mm Super Plossl pictured. So rather than spend $10US per case (plus shipping!) I used Autodesk Fusion 360 to make my own and print them with my 3D printer!

Creating the design is super simple – for the bottom create a series of concentric circles starting with the narrowest the size of the interior of the case (say 70mm) then a second circle 4mm larger (74mm) which is the wall of the case.

For the top create a second circle with the first inner circle 1/2mm larger than the outer wall of the bottom (74.5mm) and a 4mm wall (78.5mm)

Finally use the Extrude function to first raise the inside circles 4mm to form the lid of the item, and then extrude the sides up as far as you need them (say 100mm for a tall eyepiece). Save as STL files, and print. The largest eyepiece containers took 13 hours total to print and used about 200g of material, for a total cost of about $5.59 per eyepiece container.

Anything I design for 3D printing will be posted on a new section of my web site for free use by anyone. The address is: https://www.gordtulloch.com/3d-printing-for-astronomers/. Autodesk Fusion 360 is free for hobby users at: https://www.autodesk.ca/en/products/fusion-360/personal.

Quick and Easy Telescope Desiccant Caps

By Mike Karakas, RASC Winnipeg Centre

Moisture management of our optics is a crucial factor in keeping our telescopes in top condition.

We can prevent dew from forming over our lens by incorporating either dew shields or heater straps when observing, but how do we control moisture when we take our scopes out to observe and then back inside our homes in cold temperatures? How about during winter storage?

When a cold surface meets warm moist air, condensation forms. Condensation forming on the outside of our scope tubes is common but can be lessened if we gradually slow down the temperature differences. However, a more concerning issue is the potential for condensation WITHIN our optical tube assemblies (OTAs).

Open tube telescope designs like Newtonians are not as likely to suffer this fate. Even if the top of the tube is capped, the rear mirror assembly is designed to allow for air flow from the tube. However, that is not the case for closed telescope designs such as refractors, SCT's or Maksutovs. Any moisture within those OTA's becomes trapped, so it should be managed to prevent any fungal growth from building up over time.

The best preventative approach I have come across is to provide desiccant in a 2" diameter, perforated tube. There are several commercially made desiccant tubes with caps available, but an alternate solution is right inside your medicine cabinet.

Shown in the picture below, is a standard pill bottle that came from my local pharmacy. Coincidentally, the diameter of the bottle is 1 15/16" (or a bit less than 50mm), so just the right size to fit into a 2" focuser or star diagonal. Perfect! If you have a 1.25" focuser, smaller pill bottles or old plastic film canisters will work too.

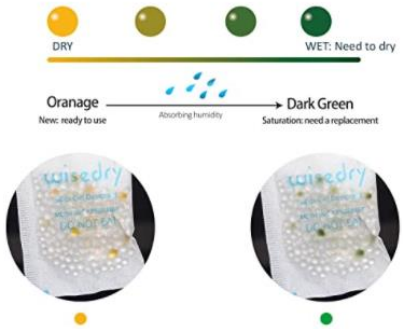
Curious to assess the airtightness of this bottle, I submerged it in water for 5 minutes and saw no water leakage. I was impressed. Watertight may not necessarily mean airtight, but that can be improved upon with a strip of duct tape around the lid. More on that later.

First step is to drill a series of small holes in the bottom of the bottle to allow air to enter, then fill the bottle with desiccant packs.

Taller pill bottles hold more desiccant and work well with larger OTA's. With these bottles, drill additional holes around the sides to help air reach the desiccant more effectively.

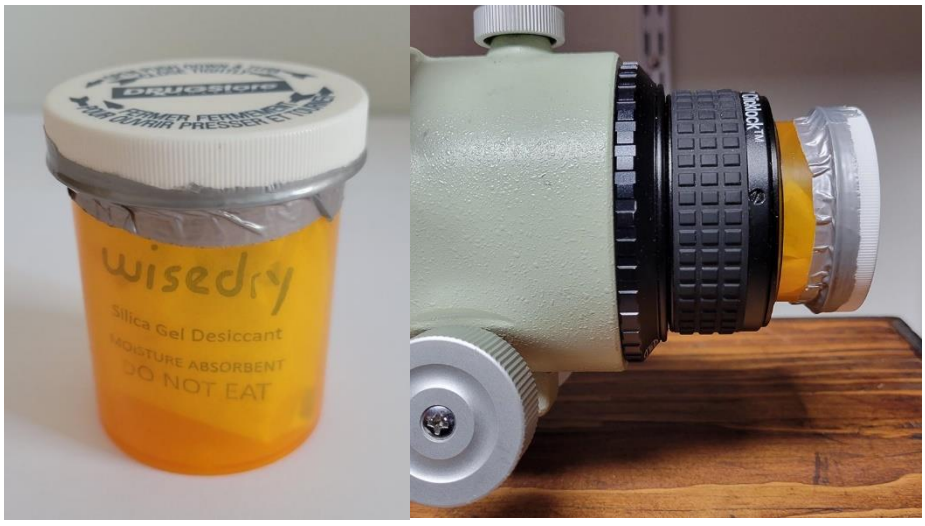
Quick and Easy Telescope Desiccant Caps (cont.)

The desiccant I use are colour coded individual packs called “wisedry” and are available on Amazon. Once the colour of the granules change, you will know immediately if they are moisture saturated and need to be recharged.



Recharging them is easy. Just place them in a microwave oven for a few minutes or in an oven on low heat for 20-30 mins. Check to see when the granules turn back to their normal colour, and you are done.

A strip of duct tape around the lid as illustrated above ensures air-tightness. Now, your homemade desiccant cap is ready for use. Voila!



This simple solution works so well that all my telescopes in storage have them now. I also keep one in my observatory scope year-round. Just be sure to check on the desiccant granular colour every few weeks and recharge when needed.

Dr. Tapping's Corner: Wooden Satellites

By Ken Tapping, NRC-CNRC

This illustrated image depicts the WISA Woodsat experimental satellite, which was expected to be launched into orbit late 2021 was delayed to mid 2022 due to frequency licensing issues. See https://www.wisaplywood.com/wisawoodsat/ for more info (Photo Courtesy: Arctic Astronautics)

Would you make a spacecraft out of wood? Surely we would make spacecraft out of space-age materials: exotic alloys and other things that can stand the radiation and temperature extremes of space. However, researchers in Japan and other countries are now looking at the possibilities of using wood for the main structures of satellites.

This old-fashioned material has a lot of possibilities in space. Firstly, it is tough and can tolerate large temperature variations. Pouring boiling water or liquid nitrogen on a piece of wood does not destroy it. Wood is a poor conductor of heat, so it can help smooth out the effect of wild temperature variations on the equipment inside the satellite. It is cheap and light. Some woods are extremely hard and others very flexible, with a myriad of woods lying between these extremes. It can be glued or fastened using entire surfaces rather than localized joints using screws. There is a centurieslong experience in the development and use of adhesives for fastening pieces of wood together.

One interesting aspect of wood is that it is transparent to most radio waves. In some cases it might be possible to put antennas and their associated electronic components inside the spacecraft body. However, one downside of wood is that it does not reflect radar signals. Unless there are large metal structures, like dish antennas attached to the spacecraft, it might be hard to see using ground-based radar. This is actually important, because being able to track satellites and space junk is an important part of managing the space around the Earth and reducing the chances of losing spacecraft in collisions, or more importantly, minimizing the risk to astronauts. Putting a metal foil cover over the spacecraft

exterior would make it reflect radar signals and make it trackable, but of course then the antennas will have to be back on the outside.

One issue that is a major driver of the consideration of wooden satellites is what happens at the end of a spacecraft's life. For many years we did not think much about what happens to satellites that stop working, or the booster rockets and other kit that wind up in orbit. After all, space is big. However, now the accumulation of space junk around the Earth is an increasingly important problem. In the next few years we are likely to see over 50,000 satellites being launched to provide world-wide 5G Internet access. There is the possibility of losing satellites to space junk collisions and there is also the issue of what to do with satellites that have ceased to work.

Today, spacecraft and unused boosters are removed by slowing them down a bit, so that their orbits touch the denser parts of the Earth's atmosphere. Travelling at speeds of around 30,000 km/h the atmospheric friction heats them to very high temperatures and the savage deceleration forces make them come apart. The result is they usually reach the ground in the form of fine dust that nobody notices. However, as the Japanese point out, this dust contains all sorts of rare-earth metals and other things. At the moment this dust fall is not particularly polluting, but when the sky is a solid mass of satellites this dust fall could become more serious. Wood does not burn in space, because there is no oxygen. However, during re-entry all that wood would burn to ash, which is non-polluting. There is probably a bigger fall of ash in the atmosphere all the time, due to forest fires burning around the world.

Wood is easy to make. It is manufacturing itself all over the world, all the time, without our help. It is maybe odd that nobody thought of this sooner. Maybe just as odd is that living in a country with loads of wood, and with a substantial part of our economy based on wood, why didn't we think of it?

Ken Tapping is an astronomer with the National Research Council's Dominion Radio Astrophysical Observatory, Penticton, BC, V2A 6J9.

RASC Winnipeg Centre Certificate Recipients

New recipients in **bold**.

Explore the Universe

Gail Wise, Mike Stephens, Janet Pollock, Janice Low, F. Lindsay Price, Ralph Croning, Terra Jentsch, Corey LeBerge, Corrine Robinson, Kevin Dromereski, Robin Clarke

Explore the Moon - Telescopic

Corrine Robinson, Kevin Dromereski, Margaret Childs

Messier Catalogue

Grant Gussie, Kevin Black, Richard Turenne, John Smith, Alan Sherlock, Timothy Zacharias, Gail Wise, Raymond Andrejowich, Stan Runge, Bernie Plett, Michael Karakas, Sean Ceaser, Gilbert Raineault

Finest NGC

Kevin Black, Gail Wise, Stan Runge, Mike Stephens, Gilbert Raineault, Sean Ceaser

Isabel Williamson Lunar

Mike Stephens

Herschel 400

Gilbert Raineault, Mike Stephens

Astroimaging - Deep Sky

Sheila Wiwchar

Astroimaging - Wide Field

Sheila Wiwchar

Review: Orion P1 Polar Alignment Camera

By Gord Tulloch, RASC Winnipeg Centre

The one benefit of having an observatory in the back yard is once you've polar aligned, you never have to do it again unless you move the mount. Unfortunately, this creates a terrible unwillingness to do anything that might move the mount since you need to polar align at the site then again once you get the scope home! This is especially true of a telescope like my Celestron 8" SCT which has a very narrow field of view, which makes some of the tools available in PHD2 and EKOS for polar alignment more difficult to use since Polaris tends to not be in the FOV of the camera.

Since I'd like to take the telescope to a dark sky site, including the Spruce Woods Star Party, this fear of polar alignment needs to be conquered. Fortunately, there's a tool out there that makes very accurate polar alignment easy and even (dare I say it!) fun! And now that I have a few mounts and camera configurations, I need to be able to quickly and easily polar align several mounts.

I decide to forge ahead with a polar alignment camera and started looking around for a vendor and discovered that Orion resells the QHYCCD Polemaster under it's brand name on Amazon, allowing me to use Prime to get free, fast delivery. The QHY product is a bit cheaper on other sites but the cost of shipping makes the cost about the same, $429, so I ordered from Amazon.ca. A week later, a box arrived.

Figure 1 - Orion P1 Polar Alignment Camera compnents

When you order this camera you need to take care to order the correct adapters for your mount, and if you need it on multiple mounts you need a separate adapter for each one unless they're the same. Since I plan on using this camera with my Sky-Watcher NEQ6, Orion Sirius EQ/G, and my Celestron CG5 mounts, I needed three types of adapters. The good news is once you have the adapters you can easily move the camera between them and quickly set them up. Oddly the NEQ6 adapter turned out to be quite a bit looser than the other two, requiring some shims to get a tight fit to the mount.

The camera arrived in a tin box with a paper box accompanying with the adapters in it – no documentation whatsoever. This was easily fixed as Orion has manuals online at telescope.com/manuals so I quickly located the correct manual, and also on the same page the Windows driver and software for the camera. Why they don't include all of this info and software on a stick with the camera is beyond me, considering the miniscule cost of memory sticks but they chose to

Review: Orion P1 Polar Alignment Camera (cont.)

inconvenience the user instead. Be sure to install the driver before attaching the camera, and install the Orion P1 software to confirm it all works.

To attach the adapter you simply split the telescope side (seen in figure 1 with a set screw) and the camera side (seen in figure 1 with three screw holes to attach to the camera). You attach the camera side to the camera with three long Philips screws. On the telescope you attach the ring by inserting into the top of the RA axis (figure 2). This adapter can stay in this position permanently, so Orion provides a cap for the hole to keep it from getting dusty . On my EQ-G this still allows the polar alignment scope to be used if you don't have the camera handy. After installing the software on my laptop (install the driver software before inserting the cable for the camera!) I connected the camera and it worked.

During the day, I attached the ring to the mount RA axis viewport – a bit fiddely to get the hex key into and you could only turn the setscrew 1/8th of a turn at a time, but if you pre-set them to almost the right spot it only takes a turn or two to tighten up the ring – it doesn't need much. The camera itself then slides into the ring and is tightened with a thumbscrew. Ready for a clear sky!

Figure 2 – Ring mounted, camera attached (lenscap on), camera with lenscap removed at night

Out under the stars, after figuring out there's a screw on cap on the lens itself (mentioned nowhere in the docs!) I managed to run through the Windows software included with the camera pretty quickly. Initially you need to roughly polar align the mount so that Polaris is in the field of view – not too hard considering the field of view of the camera is very wide, 11x8 degrees!

The software included with the camera is pretty simple – once you select the option to connect the camera, you can choose exposure and gain from 4 pre-defined options. In my case the lowest gain and exposure showed Polaris nicely. Since my mount was already pretty close Polaris was already centred, but I decentered and recentered it with my altaz adjustments on the mount and the star moved very little in the wide field. Quite a relief after trying to do the same operation using the miniscule field of my SCT!

After centering Polaris you're prompted to rotate a template until it aligns with the stars surrounding Polaris (figure 3) – this allows the software to determine the actual point of the celestial pole.

Review: Orion P1 Polar Alignment Camera (cont.)

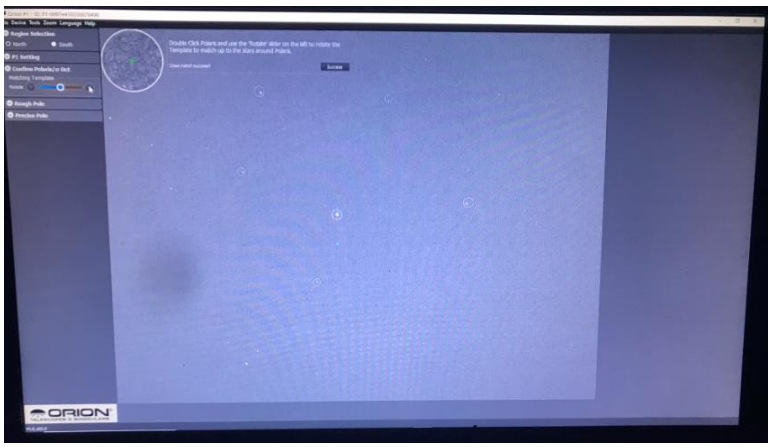


Figure 3 – Polaris Centred with alignment stars

Finally you're prompted to click on one of the alignment stars, move the mount in RA a couple of times and re-click the alignment star each time to determine where the centre of rotation of the RA axis is. Use the motors to run the mount rather than doing it by hand, which is apparently more accurate. The software will now draw a rotating circle on the screen and invite you to move Polaris into this circle using the altaz adjustments on your mount. These are generally a pair of bolts on the front and back of the interface between the mount and tripod for altitude (up/down) and a pair of bolts on the north side of the mount for azimuth (right/left). Once this is done, you're well aligned to, it's claimed, ~5 arcminutes. But there's another step that allows a "Precision Polar Alignment".

After clicking a "Start Monitor" button in the software, it will analyze the movement of stars in the camera's field and provide two boxes, one the current RA alignment, and one the correct polar alignment. Use the altaz adjustment on the scope to ensure these two boxes overlap, and you've gotten aligned to about 30 arc seconds, which should allow for longer unguided exposures on your camera (depending on focal length). I manage about 2 minutes on my EQ-G unguided.

Since I normally use a Raspberry Pi attached to my mounts, I was pleased to learn that QHY produces a version of the software for Raspberry Pi, so I need not attach a Windows laptop to do polar alignments as described above. Since I also run KStars/EKOS/PhD2 to control my mount, I was also very interested to know if I could use the Orion camera to run the polar alignment processes in PhD2 (Push here Dummy V2) and EKOS.

With INDI (Independent Device Interface, the Linux equivalent of ASCOM) configured for a QHY device starting up the driver resulted in a connected device named QHY CCD POLEMASTER-0097, with options to set the exposure, and and other options as normal. The camera turned out to be 1280x960 resolution with 3.7u pixels, 8 bits per pixel. So no problem at all running this camera under Linux and Raspberry Pi, which is great news – I can pretty much pitch the Windows software as the native software works well and the PhD2 functions are much more comprehensive.

I won't get into the nitty gritty of polar alignment routines under PhD2 or EKOS (both are extensively covered on Youtube) but even if you're a Windows user, I'd suggest using PhD2 instead of the QHY

Review: Orion P1 Polar Alignment Camera (cont.)

software included with the device if you really want to get maximal benefit from the camera especially with an unguided telescope. PhD2 automatically creates a darks library when you first connect the camera meaning any bright pixels are excluded from images used to align, and the Polar Alignment and Polar Drift Alignment functions result in a much more accurately aligned mount. You can be confident moving forward you have a good alignment with PhD2, so any additional problems with tracking can eliminate polar alignment from the mix!

Overall, I'd highly recommend this device for anyone who doesn't have a permanently mounted telescope and has to polar align every session, or those who take their mounts of out of the observatory seeking darker skies.

(Left: NEQ6 mount with P1 camera mounted)

GLP-TRAINED USERS AND SPOTTERS

The following Members have received training in the proper use of Green Laser Pointers and may apply to receive a permit to conduct an astronomy outreach session in accordance with applicable law and RASC policies respecting green laser pointers.

6 February 2021 (expires 5 February 2024)

Paul Paradis

9 August 2019 (Expires 8 August 2022)

Abdul al Manni	Patrick Curry	Kaeren Anderson	Kevin Davis	Ed Rajfur
SHR Bannister	Michael Fry	Michelle Boyce	Darren Hennig	Stan Runge
Sean Ceaser	LLoyel Hull	Ralph A. Croning	Paul Karlowsky	Bryan Stach
Clifford Levi	Dennis Lyons	Alan Macklem	Jim Mcdowal	Gordon Sharr
Krzysztof Keller	Daemon Nightshade	Gail Wise	Brian Renaud	Ed Wright

11 August 2019 (Expires 10 August 2022)

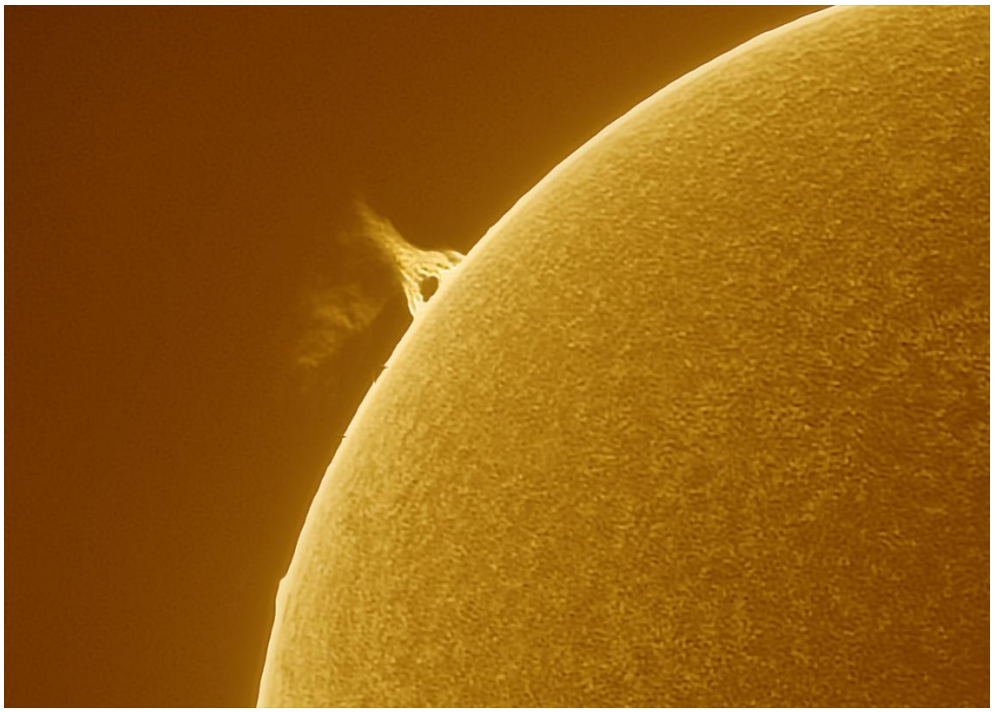
Jay Anderson	Judy Anderson

13 December 2019 (Expires 12 December 2022)

Trevor Bryant	Stephen Altstadt	Ed Johnson	Robin Clarke
Adelle Kennedy	Lucille Eustache	Timothy Kennedy	William McDonald
Kevin McGregor	Michelle Paquette		

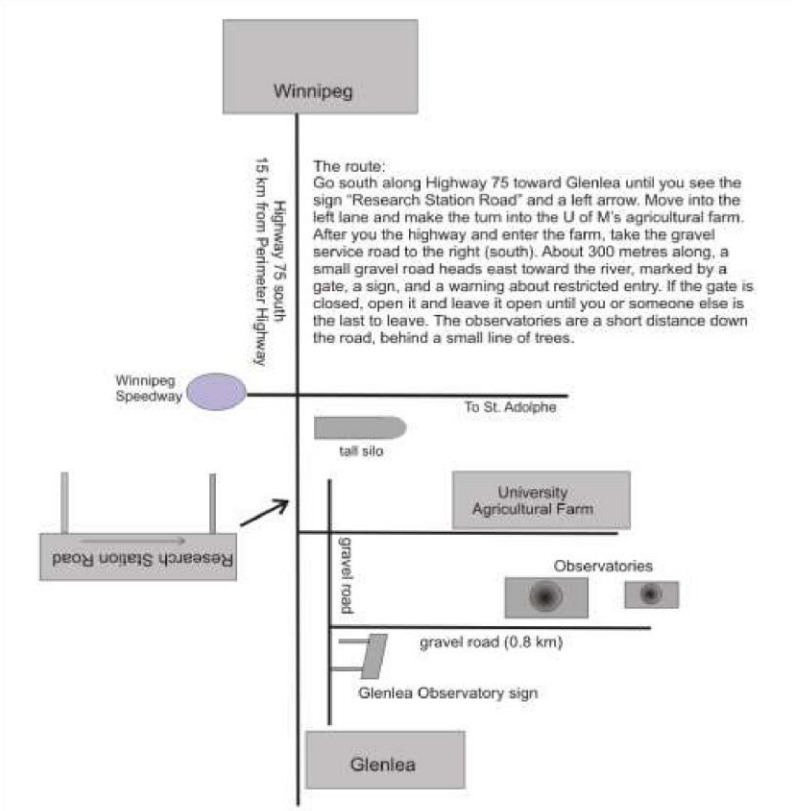
Members Image Gallery

Gord Tulloch - This image of distant interacting galaxies, known collectively as Arp 142, bears an uncanny resemblance to a penguin guarding an egg. Data was collected on the evening of February 2nd and 3rd, 2022 from the iTelescope T18 12" CDK telescope located at AstroCamp in Nerpio, Spain shows these dramatic galaxies using 10x5 minute exposures in LRGB. I'm hoping to capture this object more extensively with my own telescope this spring to increase the mount of data captured.



Sheila Wiwchar – Eiffel Tower On Fire! Feb 6 2022 This prominence was huge! It really did remind us of the Eiffel Tower in a puff of smoke!

Glenlea Observatory Information



The Winnipeg Centre maintains a working observatory, pad, and warm room at the University of Manitoba's Research Farm. The observatory contains a 30 cm Meade LX200 telescope on a fork mounting. Members of the Centre may sign up to use this telescope by emailing: observatory@winnipeg.rasc.ca

provided they have first taken a short instruction course on its use.

The Meade provides outstanding views of the night sky. Its large aperture collects more than 1800 times as much light as the human eye. It is capable of magnifying more than 500 times under favourable conditions.

The warm room also provides a convenient place for members to take refuge from winter temperatures and summer mosquitoes, or to wait out a passing cloud. The building also provides desk space and lighting for planning a night's observing session. A concrete pad in front of the warm room and observatory provides a convenient space to place members' telescopes while conducting personal observing programs. A computer is available as well.

Etiquette requires that you approach the observing site with your headlights off if that's possible on your model of car. Headlights should remain off, but you can still use your parking lights to drive. Proceed slowly, and be careful about parked cars along the road, or people walking. If you cannot turn off your headlights, make a cardboard or garbage bag mask to dim the lights or, raise the parking brake lever one click-stop. This usually turns the headlights off on most, if not all, cars. You might wish to turn around at the end of the road so that you are facing the direction back toward the highway at the end of the evening.

Remember to turn off all lights, make sure doors are locked, and close the gate if you are the last one to leave!