

# NOVA

NEWSLETTER OF THE VANCOUVER CENTRE RASC  
VOLUME 2015 ISSUE 6 NOVEMBER-DECEMBER 2015



## Lunar Eclipse Sept. 27 with Scouts Canada by Leigh Cummings

Once again we were invited by Metro Parks to help out with education about the night sky at one of their parks. This time the event was themed by a very special lunar eclipse that happened on the evening of September 27th just at Moon rise. They hosted this event for Scouts Canada at Colony Farm Regional Park in Coquitlam.

Metro Parks once again did a superb job as hosts for this event. I extend a big thanks to Peter Lawrance and his staff who did their utmost to ensure the Scouts had a great venue to observe this striking celestial event. They made us feel most welcome and made sure we had everything we needed to put on our educational talk. They also helped our volunteers

with good spots to set up telescopes to provide great views of the actual event.

As a precursor to the eclipse, my talk was heavy on the orbital mechanics that

I gave my talk twice. The first was packed and the second was well attended.

Our volunteers that night included Kyle Daly, Suzanna Nagy, Jeremy van den Driesen with granddaughter Anjuli Trenholme, and Harvey Dueck. If my memory has failed me on anyone else who was there, please accept my apology. Thanks to our volunteers' telescopes and their skill at using them, lots of scouts, guides, cubs and brownies as well as leaders and passersby got to see



causes both a very prolonged eclipse as well as extreme tides only experienced every 18.75 years. I borrowed heavily from our *Observer's Handbook* as well as several university online sites to put my presentation together to assure accuracy.

the lunar eclipse up close and personal. Pat on the back for all of you.

The park is a lovely location and the only minor drawback was Mary Hill to the east. It delayed the sighting of the  
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Photo by Oleg Mazurenko

### NOVEMBER 12

### SFU

SFU student Elise Harrington: Venus revisited: The puzzle of radar-bright highlands on Ovda Regio and Maxwell Montes. Room SWH10081

SFU

### DECEMBER 10

### SFU

AGM, followed by Dr. Christian Nitschelm: The Cosmologies of Andean Civilizations. Room SWH10081

SFU

### JANUARY 14

### SFU

Dr. Catherine Johnson of UBC EOS and NASA's Mars INSITE science team on the mission launching in 2016. Room SWH10081

SFU

## Members' Gallery



### **Emerging from Totality** by Doug Montgomery

The return of sunlight to the full moon (above) marks the end of the total lunar eclipse that was visible here on the west coast on the evening of September 27.



### **Light, Dark, and Red in Between** by Elena Popovici

Observed from Canada Place in downtown Vancouver (right) using a Sony ILCE-5000 camera.

# President's Message

by Suzanna Nagy

As we are drawing to the end of another year at the RASC, it is time to reflect on our successes and failures.

Up until the end of October, your RASC Centre business was proceeding smoothly. Unfortunately, on November 4, Vancouver Centre received a letter from the

Canadian Revenue Agency regarding our charity status. The RASC membership will be updated on this issue at the Annual General Meeting in December. In short, I can advise that Council is working very hard to correct the error identified by the CRA.

I am happy to report on the

successes:

- Our annual Paul Sykes' lecturer was Bob McDonald of CBC's Quirks and Quarks and was thoroughly enjoyed by all who attended.
- The Trottier Observatory officially opened in April with much fanfare and a

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## About RASC

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

Membership is currently \$78.00 per year (\$45.00 for persons under 21 years of age; family memberships also available) and can be obtained online, at a meeting, or by writing to the Treasurer at

the address below. Annual membership includes the invaluable Observer's Handbook, six issues of the RASC Journal, and, of course, access to all of the club events and projects.

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

NOVA, the newsletter of the Vancouver Centre, RASC, is published on odd-numbered months. Opinions expressed herein

are not necessarily those of the Vancouver Centre.

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

Remember, you are always welcome to attend meetings of Council, held on the first Thursday of every month at 7:30pm in room P8445.2 of the Physics wing of the Shrum Science Centre at SFU. Please contact a council member for directions.

## 2015 Vancouver Centre Officers

<b>Acting President/Events</b>	Suzanna Nagy president@rasc-vancouver.com
<b>Secretary/P. R./Observing</b>	Scott McGillivray secretary@rasc-vancouver.com
<b>Treasurer</b>	Bruce Hutchison treasurer@rasc-vancouver.com
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<b>At Large</b>	Michael Levy Adrian Mitescu
<b>Honourary President</b>	Dr. John Macdonald
<b>Trustees</b>	Pomponia Martines J. Karl Miller

## Library

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

## On the Internet

<http://rasc-vancouver.com> or  
<http://www.rasc.ca/vancouver>  
<http://astronomy.meetup.com/131/>  
<http://www.facebook.com/RASC.Van>

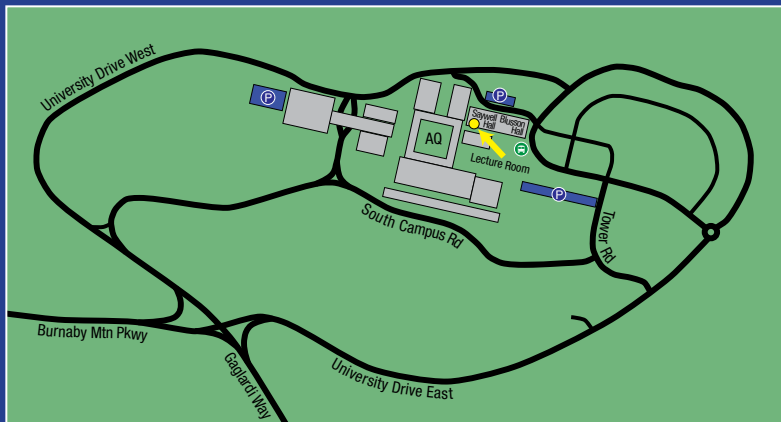


@RASC Vancouver

## Mailing Address

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

## Map to Meeting Site



### SFU

Our autumn meetings are in room SWH10081 of Saywell Hall, indicated by the arrow on the map.

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

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- star party of over 2,000 people.
- International Astronomy Day saw 8,000 people attending.
- Canada Day in Maple Ridge saw 500 people looking through our solar tele-

scopes.

- August's Perseid Meteor Shower event, although clouded over, saw 300 people attend.
- September's lunar eclipse was observed by 600 people at two different locations.



RASC – Vancouver members having lunch with Bill Nye

In total, your Vancouver Centre hosted 18 events in 2015 and this does not include the numerous impromptu star parties that popped up at different locations in Metro Vancouver throughout the year.

As always, our successes are only achievable because of the dedication of your Council, all of whom volunteer their free time and whose contributions are often unsung. I would like to thank the members of Council 2015 and hope you will join me in applauding their efforts.

We already have some amazing events planned for 2016 including two very high profile speakers for January and May whom we will announce soon but details are still being finalized. Please keep an eye on our website and/or meetup.com for those announcements. ★

# Hide and Seek, Taurus Style

by Bill Burnyeat

Outside our house is a deck, enclosed by cedar trees and bordered by wooden benches. This terrace is filled with potted plants my wife has put out until they are ready for planting. Some never make it to the garden but linger in a private floral retirement.

A strange ritual takes place here. Two watering cans are filled and placed daily on the deck. Each morning they are found overturned. The tins are filled and put back again, only to find the water spilled anew with the new day.

The cans are the nightly playthings of a family of raccoons. In the dark they arrive unannounced. They stick their noses into the cans, take a long drink, sport around, play with old shoes, or a bit of string and finally, as a kind

of climax to the festivities they push over the jugs and splash about in the brief surf that comes jetting out and across the floor planks. Often we watch all this unfold from a few

you can become a better-informed observer.

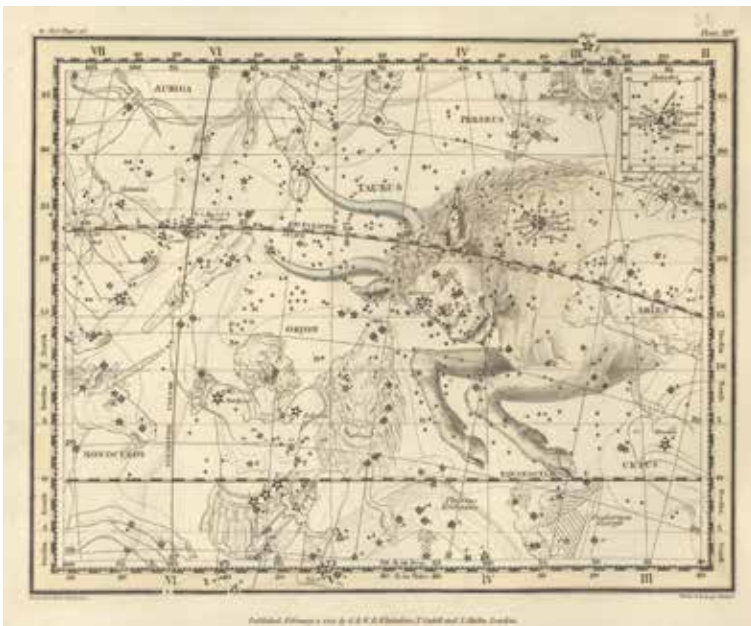
An example of a pattern, which I was expecting, came in the mail the other day. The RASC Observer's

Handbook for the year 2016 was fresh in the door. I opened it up and turned to the pages in the calendar where, not to my surprise, it highlights many occultations of Aldebaran taking place next year.

I had been watching the Moon move through the Hyades star cluster and almost

reaching this star when the clouds appeared. However, I knew before I looked at the new handbook that a bunch of occultations will take place involving Aldebaran and the

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feet away on the other side of a glass door.

The raccoons are not the only night visitors on a schedule. Many things you see in the sky also follow patterns. If you know the schedule,

## Membership has its Privileges!

New members, did you know? The Vancouver Centre has several telescopes available for loan free of charge! We have telescopes ranging from 60mm to 10" in diameter. For more information see the Director of Telescopes after the members meeting. The loaner period is for one month, to be returned after the next meeting. Telescopes are not allowed to circulate outside of these meetings. You

can now reserve two different telescopes per year and use what is left at the end of the meeting anytime.

Your greatest opportunity as a member of the RASC is to take advantage of the company of other enthusiasts to increase your knowledge, enjoyment and skill in astronomy.

The best thing you can do to gain the most from your membership is to get ac-

tive! Take in the club meetings; engage other members with questions; come out to observing sessions (also known as "star parties"), and, by all means, volunteer to take part in our many public events.

For the usual observing sites and times, visit our website at <http://rasc-vancouver.com/observing-sites/> or contact the Observing Chair at [observing@rasc-vancouver.com](mailto:observing@rasc-vancouver.com).



# Upcoming Events

## November

19 - 20 – Canadian Space Summit in Vancouver

## December

10 – AGM

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Hyades.

The bull is one of winter's highlights with strong attractions to match its bullish reputation for strength and endurance. Not just one but two naked-eye star clusters are found here, the Hyades and the Pleiades. Well positioned for north stargazers, the Pleiades rises steadily in the fall and announces itself firmly by about

Halloween. It will remain in view for the balance of the fall and all winter long. Like the Hyades, sometimes the Pleiades get a visit from the Moon and undergo numerous occultations. When?

At the offices of Canadian Planetariums we have a giant half sphere into which the planetarium projector can shine its light. I supposed the Moon should occult the Pleiades in 2028. Sure enough by moving rapidly into the future in seconds I could see the Moon perched on top of M45 on Feb. 4, 2028, and again on March 2 and yet again on March

29 (with Venus very nearby).

As I have said, I did not explore or "surf" the sky, I knew these sky events would take place and long before the 2028 Observer's Handbook is in print. I knew this must happen

because I read it in the 2010 Observer's Handbook! No magic is involved here but something just as good called the Saros cycle.

Everyone knows that the Moon goes

monthly around the Earth. Less well known is that the Moon has a longer pattern where it moves through the fixed stars and appears at almost exactly the same sky position a second time in a long cycle of 18 years, 11.3 days. I was able to go to the 2028 set of Pleiades events since I saw the action had happened in 2010, add 18 to that year, and the next set of encounters with the Pleiades was easy to predict.

If these events are on an almost 18 year cycle, does this mean the 2016 Aldebaran occultations took place 18 years ago? Yes, and turning to

the 1998 Handbook, there they are. What about Antares in the Scorpio or Regulus in Leo? They have the same tendency to be occulted and on a schedule just like the stars of Taurus. A glance at the Handbook library shows 1970 was a time for Regulus to play hide and seek. The same events are repeated in 1988 and again in 2006.

These star groups are favoured signs in the sky and were watched by observers as far back as Hesiod. The Pleiades, especially since their rise and set conveniently divides the year in two, was watched to announce the end of the season of navigation proper for vessels in Mediterranean waters.

The Hyades are also famous, and have within their triangle-shaped nest of stars the solitary first magnitude star Aldebaran, brightest star in Taurus, and brightest of the stars that may be occulted by the Moon.

The Moon has a special relationship with stars in that it can process over top of the star in what is called an occultation. Only zodiac stars have the honour of the Moon's stealthy visit. Aldebaran and Regulus enjoy this treat but Sirius and Vega can never be so involved and the Great Bear's glum look on star maps is, I believe, his resentment at the fact the Moon never honours him with a trip through his great dipper.

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The Moon occulting Aldebaran

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The occultation's are a particularly well suited for the urban observer and beginners, since no maps or star hops are needed for this. First, find the Moon then note the field just to the east and, having found the star, all one has to do is wait. Each second the star comes a bit closer to the Moon and soon the gap is noticeably closed. Then, the star seems hanging

glued to the Moon's limb. Then, with little fanfare, the star is gone. A small refractor is a perfect tool in the occultation watchers kit. The refractor has internal baffles that manage stray light and one of the problems of the occultation is the vast difference in brightness between the Moon's surface and the star (however bright) that will become occulted.

This is not to say reflectors aren't useful; it's just, given a choice, the small refractor is a handier scope for this than a large Newtonian.

Two situations greet the star that is going to become occulted. It can disappear behind an unlit limb, after full Moon, or the occultation can take place by a disappearance into a lighted limb, the situation before full Moon. The occultation that takes place after full is thus to be preferred but, of course, one must take what is given and be grateful.

In a typical event, I take a look at the sky and spot the Moon some distance to the west of the star that is to be visited. Since the Moon moves eastward at a daily rate of about 13

degrees, the Moon moves its own diameter, of half a degree, in about one hour. Setting the telescope so that the Moon's limb and the star are seen at the same time, one then watches the star creep up on the Moon. It gets closer and closer and then, it seems to stall on the edge of the Moon as though it has reconsidered the plunge and with misgivings has attempted to back out. This



The Moon passing through the Pleiades

is similar to the old kitchen adage about a watched pot never boils. Time seems just a bit suspended as the star comes to the end of its complacent wanderings and is at the moment of crisis when it ends its Earth views and suddenly is plunged into a landscape of lunar deserts—well, perhaps the star might have second thoughts about this. The occultation is usually described in books as completely instantaneous. Logically, this is true. The pencil of light coming from the star is tiny and its interruption an event of the smallest moment. For this reason, the occultation is almost unique in astrono-

my, where the scale of change is slow or non-existent. Yet, my own experience is that the star takes an appreciable amount of a whole second in which to disappear. Sometimes, in the case of a grazing occultation, the star might vanish behind a lunar feature, like a mountain or crater wall and then, reaching a low point in the lunar terrain, the star hops out again as though taking a last look Earthward before plunging into darkness.

Another twist on the occultation moment is where the star disappears in stages. At the lunar limb the star is seen to dim but not to vanish and some few moments later it totally disappears. This points to an unresolved double star. One component takes the plunge while the other is still in the clear. Careful timings can determine the separation and other features

of pairs like this and some doubles have been discovered in this way.

Historically, occultations were one of the first ways in which the relative distances to astronomical bodies were determined. Aristotle says the Moon and Sun are nearer to Earth than the planets and gives as evidence an occultation of the planet Mars, proving this world is more distant than the Moon. The stars too are always behind and never in front of the Moon and Aristotle quotes unnamed “mathematicians” as stating this shows stars must be nine times farther than the Moon.

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This must take a kind of record in the understatement department.

It was an occultation of Aldebaran that led to a significant understanding of how the celestial system is fitted together. The stars are called fixed as opposed to the wandering planets of the solar system but can stars really be immobile? If the stars of the galaxy were at rest with respect to the centre of the Milky Way, gravity would soon collapse the entire galaxy. Similarly, if all planets stopped orbiting the Sun and were not in motion with respect to the Sun, the solar system too would collapse. So, it seems from Newtonian mechanics, the stars must have some orbital motion to

counter their tendency to fall into a mess. Yet the stars resisted all attempts, at least in the 17th Century, to detect change.

Enter the occultation of Aldebaran. The friend of Newton, Edmond Halley, noticed an account of the Moon passing over this star at Athens in March, 509 AD (sorry I must have mislaid my Handbook for that year). Halley calculated that the Moon would have missed the star, and the event would have been an unreported “miss” if Aldebaran were at its current position. It pointed to the slow wandering of this star over

the more than one thousand years separating the event and Halley’s speculation. He then investigated the position reported in ancient catalogues and found many bright stars were set at positions slightly at variance from the measured positions published in his own day. Stars, it seemed, were just as mobile as planets but the huge distant to these

to an accuracy far better than can be achieved at the eyepiece of a backyard telescope.

Today, interest in the occultation is twofold. One is the wonder of the interacting of the star and Moon, the dissimilarity of the two things, yet one grasping the other is similar to those instants in nature that can nearly stop our heart as the eagle

grasps its fish, the sudden fall of ice and snow rumbling down from a silent mountain peak, the flash of a fish breaking the water—the occultation has something of all these events in it and yet more. To observe it, one must hunt for the field, know the time and sit and wait. It’s a kind of big game hunting amongst the stars.

This brings us to

the second point. By watching the event, we hone our skills as observers and enjoy the benefits that go along with accruing more skill.

The skills needed to observe occultations, while not difficult, remind us of other talents which buoy our spirits by acquiring them. This is especially important today when so many skills are in the process of simplification in the name of “convenience” or eradication since they may not be executed to perfection. Forgotten is it would be more convenient never to have observed at all. ★



The Pleiades (M45)

bodies effectively disguised the fact from a casual inspection.

Attitudes towards occultations have changed in recent decades. In Patrick Moore’s *Amateur Astronomy*, first published in 1957, occultations are treated as a technique for gathering data on the position of the Moon. Since the star is nearly fixed on the celestial sphere, the exact moment the Moon reaches here was formerly of use to an analysis of the Moon’s position in time. All this changed in the 1960s and 1970s due to the Moon landings and the “from space” scrutiny of the Moon



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Moon for a while and our first views were through the taller trees on top of the hill. I thought in some ways the trees added to that surreal sort of look that a full Moon rise tends to have. Added to that feeling was the colour. When it first appeared, it was quite dim, probably due to our moist west coast air filtering the moonlight. Once the Moon got above the trees, it became much more visible and I think it gave everyone quite a treat. The dark red colour caused by the

refraction of sunlight through Earth's atmosphere gave it that spooky "Blood Moon" look that has become a media catch phrase. Later, we got the first glimpse of direct sunlight touching the leading edge of the Moon. We then got to follow a whole half month of lunar phases as the Moon came out of Earth's shadow. When the Moon was finally out from behind the Earth's shadow, we were treated to a perigean full Moon. With the full Moon near its closest approach to the Earth, it was almost 12% larger

in apparent diameter than when it is at apogee. It reminds us of why our ancient ancestors both worshiped and feared the second brightest body in the heavens. It also inspired them to study its movements with great precision and build the observing sites to follow the Sun and Moon's movements in the sky overhead.

Thanks to Metro Parks and our volunteers, we were able to experience this moving event with officially 169 guests, most being young Scouts, Guides, Cubs, Brownies, leaders and parents. ★



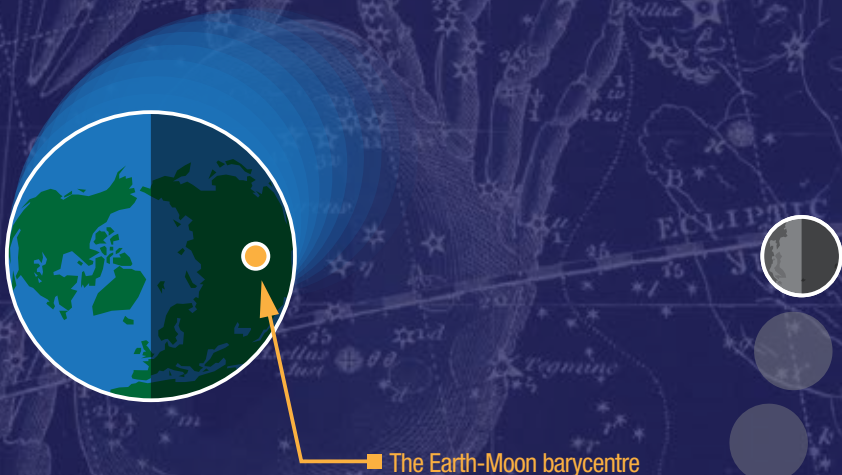
Photos by Elena Popovici (top) and Gordon Farrell (bottom)

# DID YOU KNOW? The Earth is closer to the Sun when the Moon is full

Like an adult spinning a child around while locking arms, the Earth spins in tiny circles as the Moon orbits us. This means the Earth is wobbling around a point (called the “barycentre”) that’s about 4600 km above its centre, closer to the surface than the core.

This wobble pushes the Earth slightly closer to the Sun when the Moon is full and slightly farther away when the Moon is new.

But since this only varies the Earth’s distance from the Sun by 0.00062%, you’ll never notice it.



## BONUS FACT:

In the case of Pluto and its largest moon Charon, the barycentre lies well outside of Pluto. Even more surprising, Jupiter exerts enough of a pull on the Sun for the latter to be in orbit of a point just above its surface.

## Members' Gallery



### Sunspots by Elena Popovici

Sun spots growing and moving from day to day, left to right across the face of the Sun, taken from downtown Vancouver. Dates: 15/09/26 (1:44pm) and 29 (10:03am). Equipment: Sony ILCE-5000 camera attached to 102mm Sky-Watcher reflector telescope, with prime-focus + barlow adapter setup.

### Morning Planets

by Elena Popovici

Jupiter and Mars (the latter right on top of the former, at left of building), trailing behind Venus (just left of the building's spire). About 50min before sunrise on Oct. 16.

At far right is a close-up of Jupiter and Mars. Jupiter's four moons are seen below it. From the bottom-left, up towards Jupiter, they are: Callisto (dimpest), Ganymede, Io & Europa.

Sony ILCE-5000 camera (for close-up, attached to 102mm Sky-Watcher reflector telescope, with prime-focus adapter setup).





**VANCOUVER TELESCOPE CENTRE**  
Serving the Astronomers of Vancouver and British Columbia since 2004

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# NexDome

The *NEXt* Generation Observatory



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