PeGASus

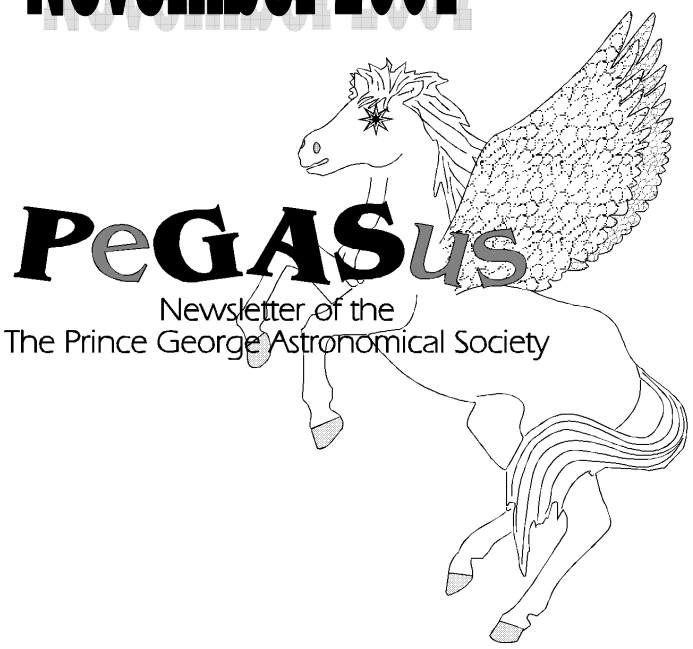
Newsletter of the

Royal Astronomical Society of Canada: Prince George Centre

Published: January to May & September to November. www/rasc.ca/princegeorge

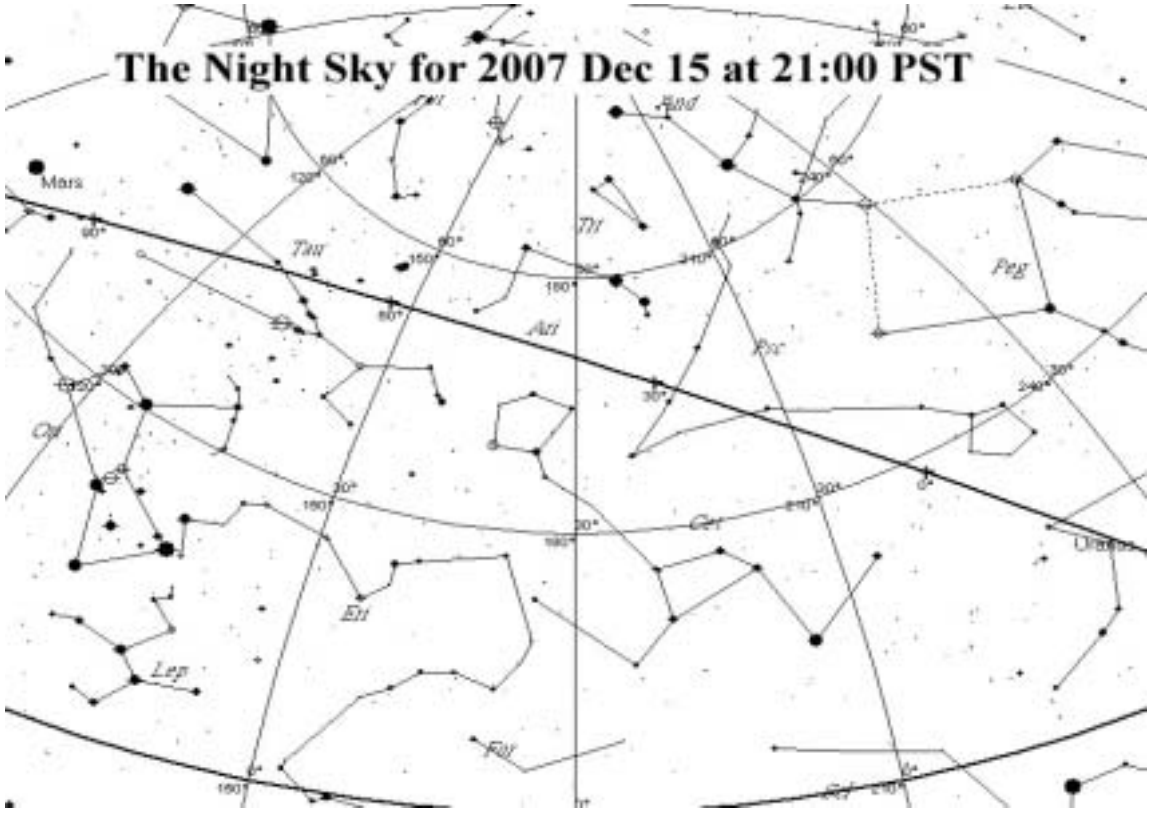
November 2007

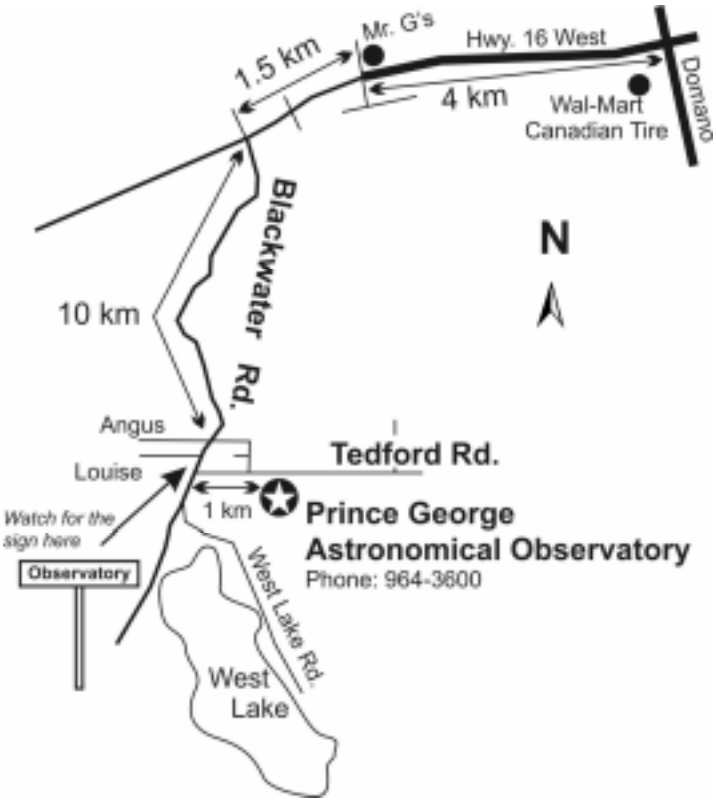
Our pursuits are out of this world.
Our activities are astronomical.
Our aim is the sky.



In Issue # 163

The RASC: Prince George Centre meets next,
Saturday November 24, 7:30pm
at the Observatory for a Social Evening





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Contributions to the newsletter are welcome.

Deadline for the next issue is
January 12, 2007

PeGASus Editor
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Coming Events

To Volunteer to help run an event please contact Brian Battersby.
brianbattersby73@yahoo.ca
Phone: 561-8138 (day) 612-4623 (evening)

Date	*Event*	*Time*	*Place*	*Volunteers*
Nov. 16	OPEN HOUSE	7:30 pm	Observatory	Greg M, Al H
Nov. 17	OPEN HOUSE: Leonids	8:00 pm	Observatory	Brian B, *everyone!*
Nov. 22	TOUR	7:00 pm	Observatory	Blair S, *HELP*
Nov. 23	OPEN HOUSE	7:30 pm	Observatory	Bob N, Bob S
Nov. 24	CLUB SOCIAL NIGHT	7:30 pm	Observatory	*all welcome!*
Nov. 30	OPEN HOUSE	7:30 pm	Observatory	Bob N, *HELP*
Dec. 12	CHRISTMAS PARTY	6:30 pm	Observatory	*all welcome!*
Jan. 9	BUSINESS MEETING	7:30 pm	Arctic Manufacturing, Hart Hwy.	*all members welcome!*
Jan. 26	NOVA Class 1: How to Observe	7:00 pm	Observatory	Brian B

For an up to date list of the Volunteer Schedule visit our website in the MEMBERS AREA
www.rasc.ca/princegeorge

Editorial

by Brian Battersby

Clouds, rain, snow, fog, haze, these are a few of my least favourite things. They all conspire to ruin almost every observing session I embark on here in Prince George. The clouds even followed me on a recent trip to Toronto. Sigh. Unfortunately, I can't do much about the weather.

There is one thing which ruins the night sky that I can do something about though, light pollution. Light pollution is defined as "any adverse effect of artificial light, including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste" by the International Dark Sky Association. [www.darksky.org/]

There are many other reasons to be concerned about light pollution these days besides being unable to see the starry sky. Light pollution has been associated with certain cancers, harms nocturnal animals and the migration of birds and makes it hard for aircraft pilots to navigate. The number one problem is that at its heart light pollution is wasting energy. The energy we use comes from the Earth at a cost, pollution. Pollution fuels global warming. Global warming makes the Earth uninhabitable for everyone. This is a BIG problem.

You can do your part by turning off unnecessary lighting and converting to high efficiency lighting. High efficiency lighting = less pollution + lower utility bills + better environment + a darker sky. We all win if we work together.

If you want to work on Light Pollution Abatement in our community contact Mauirce Sluka. msluka@telus.net

Brian Battersby

What's Out There
No Place Like Home

by Fae Collins Mooney

I couldn't do it. I thought I could. I tried. For 6 weeks, 5 days, and an assorted number of hours, minutes, seconds… But I just couldn't do it.

You see, I left the RASC. In spite of my claims in my last column that I was ready to embark on a solo flight through the cosmos, I couldn't stay away.

The one thing I discovered while roaming about the Universe – alone – is that life without the RASC is not much fun. My membership in the society spanned almost a quarter century of orbits around old Sol. But more than that, it was about being able to participate in a passion for things astronomical that I could share with others – with all of you. And so, when a friendly photon passed my way I grabbed hold and hitched a ride back home.

Besides, the PG Centre has so much to offer the curious mind: home based (home being our first class observatory) nighttime exploration of the lunar surface, for example, and safe solar viewing during the day; from far to near: searches for distant supernovae and observations of near earth asteroids, and even radio detections of meteors crashing through our planet's atmosphere; hunts for Messier objects (just for the sheer delight of taking a cosmic safari), serious studies of variable stars… It's an ever-growing list of observing opportunities!

Opportunities for learning too – or maybe just a memory refresher - with NOVA (New Observers to Visual Astronomy). And don't forget what's available for loan at the PG Centre's library.

For the more technically minded, there's telescope making, software development, image processing, and the challenges of astrophotography. And for the environmentally aware, there is the growing concern about the need for light pollution abatement.

All these things, and more, are part of our PG Centre. Every member has reason to be proud – of our history, our accomplishments, of all that we offer, of all that we contribute and the support we provide – to each other, and to the community.

Sometimes we need to leave home in order to appreciate it. I'm very grateful to the PG Centre for allowing me to be a part of it all. It's nice to be home again.

Fae Collins Mooney

News Flashes

by Brian Battersby

The annual POTLUCK Christmas party will be held on Wednesday, December 12th. 6:30 pm. Show off your cooking skills and bring your favourite dish for all to enjoy! This is always a fun, welcoming evening. I hope to see you all there. Contact Brian to RSVP or if you have any questions. brianbatters-by73@yahoo.ca

Gregory Mohammed receives his Explore the Universe Certificate at the October 27th meeting. *Photo:Blair S*

cont'd next page

Equipment / Resource Policy reminder. All equipment must be singed out in the "Resource Sign Out Book" when borrowed from the observatory. Equipment / resources should be returned within 3 to 4 weeks. If a longer period is needed or you are unable to return the equipment on time a notice should be sent to the Executive at pgcentre@yahoo.com

* * *

The Prince George Centre membership survey is now complete. Thank you for all your comments and suggestions. The executive will do its best to act upon as many as possible to improve your experience in the Centre.

* * *

Tours and Open Houses will be cancelled at the discretion of the Host when road conditions are poor. The Host will contact Tour Helpers and guests upon the decision to cancel.

The Night Sky for December 2007

by Bob Nelson, PhD

Hi Folks,
Here's what is happening in the sky this month, in the usual order: [Note: All times are on the 24-hour clock, PST.]

MERCURY The Sky 7 tells me that, at midmonth, it lies some 13° above the SSE horizon at sunrise, but it's extremely hard to see this month. It reaches superior conjunction on Dec. 17.

VENUS, is a morning object all month. At midmonth, it rises at 04:23 and, at sunrise, lies some 22° above the SE horizon. It will be a 16" gibbous blob, 71% illuminated and of magnitude -4.1.

MARS, in Gemini, (until Dec 30, when it passes into Taurus), is up all night this month. It reaches closest approach on Dec. 19 (when it is a disk of 15.88") and opposition on Dec. 24 (only 15.80"). As oppositions go, this one's a piker. Because of the eccentricity of Mars' orbit, and where its perihelion lies, the best oppositions are in the late summer months. (That happened in 2003 -- angular size 24.5", and will happen again in 2018, 24.2". The next opposition, in early 2010 will be even poorer, at 13".) Anyway, at midmonth, the planet rises at about sunset, transits at 01:15 (PST) and lies 9° above the WNW horizon at sunrise.

JUPITER, in Sagittarius all month, is an evening object (just barely) at the start of the month. At sunset, it lies about 2° above the SW horizon and sets about 1.5 hours later. However, it lags behind the Earth (as it always does) and moves toward the Sun, reaching conjunction on December 23. Therefore, it is largely unobservable this month.

SATURN, in Leo until 2009 (Sept), is a late-night and morning object this month. At mid-month, it rises at 22:11 (PST), transits at 05:19, and is visible at sunrise, lying 40° above the SW horizon then. It's an 18" disk of magnitude 0.7. Have a look for it, those of you who get up early!

URANUS, in Aquarius until 2009 (March), is an evening object this month. At midmonth, it lies some 15° above the SE horizon at sunset and sets 7 hours later (at 23:11, PST). As usual, it's a 3.6" disk at about magnitude 5.7.

NEPTUNE, in Capricornus until 2010 (March), is also an evening object this month. At midmonth, it lies some 17° above the SSE horizon at sunset and sets about 5 hours later (at 20:45, PST). As usual, it's a 2.3" disk at about magnitude 8.0.

Winter Solstice (Summer Solstice south of the equator) occurs on December 21 at 22:08. Officially, it's the first day of winter in P.G.

CONSTELLATIONS to look for in December (at 21:00) are Fornax, Eastern Cetus, Western Eridanus, Aries, Triangulum and Western Perseus.

Fornax (For, "The Furnace"), is another southern constellation with a number of faint galaxies.

Eastern Cetus (Cet, "The Sea Monster"). In eastern Cetus, we see Omicron Ceti, or Mira ("The Wonderful"). Mira was the first of the long period variables discovered; I've discussed this star before. Six or seven degrees northeast of Mira lies M77, a bright and compact spiral galaxy of 10th magnitude. According to

See Bob's image on the website under "Photo of the Month". www.rasc.ca/princegeorge

Comet 17/p Holmes in Perseus

Burnham, it's unusual in that it has three spiral arms. Also, this galaxy (together with the "Sombrero" Galaxy in Virgo) was the first to reveal a large recessional velocity. In November 1913, V.M. Slipher obtained spectra with exposures over 6.5 hours (!) using the 24" refractor at Lowell Observatory.

Western Eridanus (Eri, "The River"). is a large constellation out of the Milky Way; the southern part (which we cannot see from Prince George) zigzags its way south to -60 degrees where the bright star Achernar (Alpha Eri) resides. The triple star system Omicron 2 Eridani consists of a wide (82") AB pair making an orbit in some 7000-9000 years. (The 'A' star is of spectral type K1 V with visual magnitude 4.5.) The inner BC pair is separated by some 9" at the moment; the 'B' star is a white dwarf (magnitude 9.7) and the 'C' star is a faint red dwarf (magnitude 10.8); and the orbital period is some 248 years. This white dwarf was the first to be recognized as such and is certainly the easiest to find with small telescopes. It is about equal to the Earth in size and a little less than half the mass of the Sun. Consequently, its density is some 90,000 the density of water (it's one big atom, folks!).

Aries (Ari, "The Ram"), is the first entry in the Zodiac and is a northern constellation out of the Milky Way. The brightest star, Alpha Ari is a red giant (sp. K2 III) and lies about 75 light years distant. The really good nebula, NGC 6188 lies, alas, at -48 degrees declination and is not visible from Prince George. NGC 6397, a fine globular, is also too far south for PG astronomers.

Triangulum (Tri, "The Triangle"), is a small constellation just south of Andromeda and contains the famous galaxy M33 ("The Pinwheel"), discovered by Messier in August 1964, and a member of the Local Group of galaxies. As most visual astronomer know, it is a surprisingly difficult target, owing to its large size and low surface brightness. Burnham reports that individual experiences vary – some find it easily in binoculars (or even with the naked eye), whereas others cannot find it at all and conclude that the position must be in error! [My own experiences lie between these two extremes!] And it is truly large! Burnham says that in the best photographs the nearby galaxy measures some 60' x 35'. With truly large telescopes (or a CCD camera on a backyard telescope), M33 is revealed as a huge double spiral with a small nucleus (Hubble type Sc). It was first studied by Hubble himself who found many high luminosity O and B stars, open and globular clusters, Cepheids, irregular variables and novae. (Today we know that the arms are the location of active star formation.) Owing to the many hot stars, M33 is bluer than most galaxies, as would be revealed in a long CCD exposure (that I hope to take next period of clear, steady air). In the early 1900s, the distance was set at 750,000 light years; in the 1950s (when the Cepheid zero point was recalibrated), this distance was more than doubled. It is interesting to note that M33 is practically stationary with respect to our galaxy: it is approaching at a mere 7 km/s. Another fact is that M31 and M33 lie only about 570,000 light years from each other – about 4x closer than we are to either. All three galaxies contain roughly the same mass – about 2 billion solar masses.

Western Perseus (Per, "The hero that saved Andromeda"), is a northern constellation (appearing overhead at times), is in the Milky Way and contains many wonderful objects familiar to many of us. One object is Beta Persei or Algol, the most famous of the eclipsing binaries. Also in this constellation, look for the Double Cluster. It's very prominent to the naked eye, lying as it does about halfway between Alpha Persei and Gamma Cassiopeia (the middle star of the big W in the sky). For what it's worth, the official designation is the "h and X (chi)" Clusters, where the former is NGC 884 and the latter 869. References to the cluster go back as far as 150 BC - both Hipparchus and Ptolemy (early Greek astronomers) noted the clusters - but the actual nature of the clusters was not known until telescopic observations were possible. Today we know that the clusters lie about 7400 light years distant; each has a diameter of about 70 light years and contains about 5000 solar masses. They are a striking view in binoculars, in finder scopes or in telescopes of any aperture.

Bob Nelson

Orionid Meteor Shower

2007/10/20 - 2007/10/21

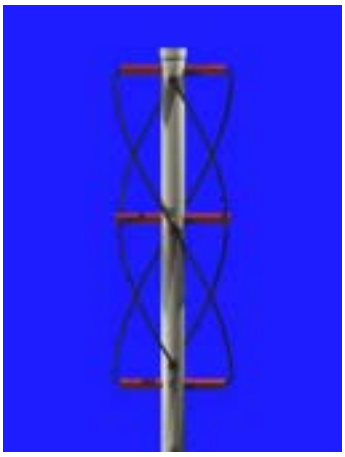
by Glen Harris

The observatory's automobile FM radio is coupled to a Quadrifilar Helicoidal (QFH) antenna and receives a signal from a distant radio station in North Dakota when a meteor ionizes the atmosphere, causing the radio signal to reflect towards the receiver. The program Radio-SkyPipe (R-SP) takes the signal and converts it to information shown in graph form.

Earth passed through the debris field of Halley's comet on Saturday, October 20th and Sunday, October 21st. Comets, named after the person or persons that discovered them, shed material as they are melted by the heat of the Sun while traveling through our solar system. As our location on Earth rotated into the path of the comet's debris field, R-SP detected an increase in meteor activity.

The chart shows a minor peak from 9am to 3pm UTC on the 20th, with the main peak occurring between 10am and 5pm on the 21st.

UTC, which is 7 hours later than our local daylight saving time, is also referred to as Greenwich Mean Time, the base line from which all time zones on Earth are determined.



Quadrifilar Helicoidal Antenna constructed to work in the FM radio band (88 - 108 MHz)

Scientific predictions were for 20 - 60 meteors per hour during the peak period, whereas R-SP recorded 12 - 54 meteors per hour during the main peak. The higher the signal level is, the longer the meteor exists in the atmosphere before burning up.

Any meteor that survives its journey through Earth's atmosphere and collides with the earth is called a meteorite. A meteor still in the depths of space is called a meteoroid.

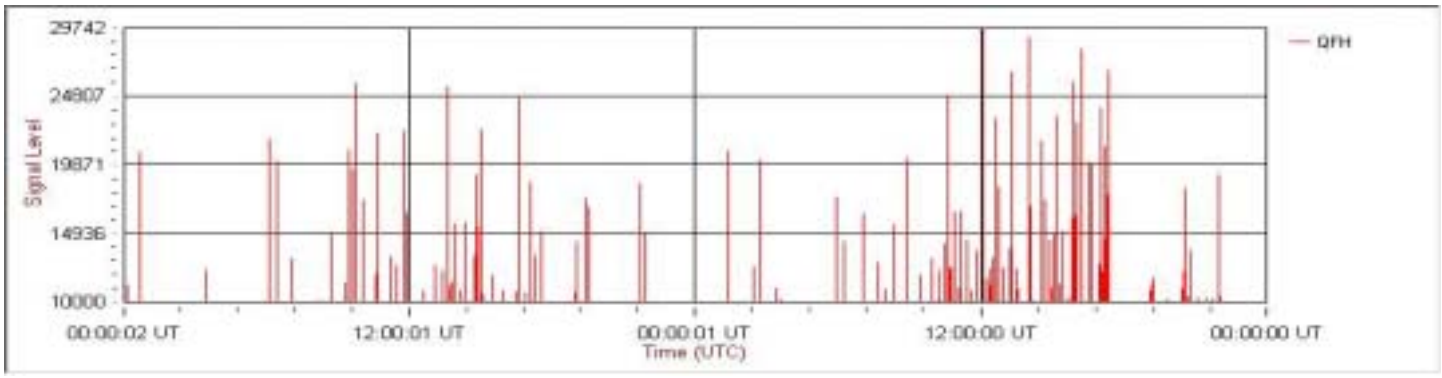
Not all the meteors counted had a radiant (origination) in Orion, as sporadic meteors can occur at any time, from anywhere, but the trend is quite evident. The occurrence of sporadic meteors can be seen in the data preceding and between the two peak times.

American astronomer Edward C. Herrick first described the Orionids in 1839. English astronomer Alexander Herschel made the first known detailed observation in 1864.

The next meteor shower, the Leonids, occurs on Saturday, November 17th when Earth will be passing through the debris field of comet Tempel-Tuttle. The Leonids are best known for their 33-year peaks, during which 100s of meteors per hour can be observed. The last of these peaks occurred in 2001. With the 1st quarter moon being at its highest elevation at 6:23 pm and the meteor shower peaking at 8 pm, viewing this meteor shower will be difficult. However, current plans are to have the observatory open to the public on that evening.

The chart at below shows data collected by the Radio-SkyPipe program.

Glen Harris



Date	Time	Count	Date	Time	Count
2007/10/20	00:00:02 01:00:02	2	2007/10/21	00:00:01 01:00:01	0
2007/10/20	01:00:02 02:00:02	4	2007/10/21	01:00:01 02:00:01	2
2007/10/20	02:00:02 03:00:02	0	2007/10/21	02:00:01 03:00:01	2
2007/10/20	03:00:02 04:00:02	1	2007/10/21	03:00:01 04:00:01	4
2007/10/20	04:00:02 05:00:02	0	2007/10/21	04:00:01 05:00:01	0
2007/10/20	05:00:02 06:00:02	0	2007/10/21	05:00:01 06:00:01	1
2007/10/20	06:00:02 07:00:02	3	2007/10/21	06:00:01 07:00:01	2
2007/10/20	07:00:02 08:00:02	5	2007/10/21	07:00:01 08:00:01	3
2007/10/20	08:00:02 09:00:02	1	2007/10/21	08:00:01 09:00:01	3
2007/10/20	09:00:02 10:00:02	12	2007/10/21	09:00:01 10:00:01	3
2007/10/20	10:00:02 11:00:02	7	2007/10/21	10:00:01 11:00:01	16
2007/10/20	11:00:02 12:00:01	2	2007/10/21	11:00:01 12:00:00	12
2007/10/20	12:00:01 13:00:01	4	2007/10/21	12:00:00 13:00:00	45
2007/10/20	13:00:01 14:00:01	10	2007/10/21	13:00:00 14:00:00	37
2007/10/20	14:00:01 15:00:01	10	2007/10/21	14:00:00 15:00:00	54
2007/10/20	15:00:01 16:00:01	5	2007/10/21	15:00:00 16:00:00	37
2007/10/20	16:00:01 17:00:01	6	2007/10/21	16:00:00 17:00:00	40
2007/10/20	17:00:01 18:00:01	3	2007/10/21	17:00:00 18:00:00	0
2007/10/20	18:00:01 19:00:01	0	2007/10/21	18:00:00 19:00:00	6
2007/10/20	19:00:01 20:00:01	4	2007/10/21	19:00:00 20:00:00	4
2007/10/20	20:00:01 21:00:01	0	2007/10/21	20:00:00 21:00:00	7
2007/10/20	21:00:01 22:00:01	4	2007/10/21	21:00:00 22:00:00	5
2007/10/20	22:00:01 23:00:01	0	2007/10/21	22:00:00 23:00:00	0
2007/10/20	23:00:01 00:00:01	0	2007/10/21	23:00:00 00:00:00	0

Comet 17/P Holmes Chatter

by excited club members!

The recent, unexpectedly bright, fantastically well placed for northern observers comet, 17P Holmes has proven to be a wonderful treat. To record the event I have included some of the email chatter generated by Prince George Centre members viewing the comet. Nothing like observing to bring the Centre together!

THURSDAY - OCTOBER 25
DOUG WAYLAND

Comet 17P/Holmes in Perseus has suddenly brightened to naked eye visibility, even with the full moon in the sky. To the naked eye it is as if there is an extra star in Perseus. With binoculars it appears as a fat fuzzy lop sided star. Here is a finder chart from spaceweather.com web site, just grab your binoculars for a quick look. It will be interesting to see how it changes in the coming days.

http://spaceweather.com/images2007/24oct07/skymap_north_holmes.gif

This comet is easily viewed from the city with the finder chart I sent this morning. Just remember, though the comet is bright, it is star like. This morning when I viewed it, I could see the "out of place" star in Perseus. The binoculars showed an unusual object. I want to see it in the scope when I get a chance. Hopefully it will stay in outburst for some time.
Here is the skyhound website, with info and a chart as well.

http://www.skyhound.com/sh/skyhound.html

This comet doesn't appear with a long tail as you would expect, but rather as a fuzzy yellowish round ball of light with a bright offset core. This is because the comet is directly opposite the sun from us and we are looking directly down the length of the tail which streams away from the nucleus on the opposite side from the sun. The comet is receeding from us, so probably won't grow more dramatic over time, but could stay bright for quite awhile according to information I have read on the net. They think it may have been hit by an asteroid and broke open allowing a lot of fresh dust and ice to vaporize in the solar radiation causing the sudden brightness.
Perseus area is circumpolar from our latitude, therefore it will be viewable any time of the night when it is clear. In the evening it should be high in the NE, in the early morning, almost directly overhead, slightly NW.

Enjoy,
Doug Wayland
RASC PG Centre

MONDAY - OCTOBER 29, 2007
ROD & MILLY SAVILLE

Hi Doug!
Rod and I just came indoors from looking at the comet!! and I must thank you tremendously!! I went out first and found it with the naked eye and the binoculars, then Rod brought out the Starblast scope that we borrowed from the Society! Marvelous!! I'm such a novice that this is the first 'wonder' that I've ever seen and only the second time I've looked through a scope at anything! , so I was in awe! Then we looked at the moon and once more I was awestruck! How marvelous! This new hobby is unlike anything. I want all my kids and grandkids and our moms and **everyone** to see this stuff. Okay -- I really just got on here to say thanks for pointing out the comet to us :) Good night.

Milly and Rod

TUESDAY - OCTOBER 30, 2007
DOUG WAYLAND

Hi Milly,
That's great, I had a look last night with my binocs, and was totally impressed with the view as well, it has grown a lot in the last few days. I hope this comet stays bright for quite awhile as it is so well placed for us northerners.

Everyone, if you get a chance get out and take a look at this comet, it is so easy to find now, even from within the city. Watch over several nights to see the changes in size and brightness.

Doug

TUESDAY - OCTOBER 30, 2007
BOB NELSON
Hi Folks,
Although the comet is very bright, it is difficult to find with a CCD camera unless you have the coordinates. Sky and Telescope is woefully inadequate in this respect.
The link [http://cfa-www.harvard.edu/iau/mpc.html] is to the Minor Planet Centre, which offers professional-level data. With the data, I easily found the comet with my CCD camera and its restricted (10' x 15') FOV.
I hope to put together a colour image, as soon as I get my telescope back to work. ;-)
Bob

WEDNESDAY - OCTOBER 31, 2007
PAMELA den OUDEN
Hi from Fort St. John!
It's a beautiful clear night here with not a cloud in sight, and with the late rising moon, I've just had a view of the comet in Perseus. Doug, thanks for the maps; the one from spaceweather.com helped me find the comet. Tonight I used only my binoculars because it was really windy, but I hope to set up my telescope for a better view, perhaps over the weekend, if it's clear.

Milly and Rod, I share your excitement. I'm a beginner, too, and I love to look and find sky objects, even though I'm not very knowledgeable. But now, I know Perseus!

Pamela den Ouden
Fort St. John member of PG Centre

WEDNESDAY OCTOBER 31, 2007
BOB STEVENTON
Hi Brian,
Clear skies here until about 7:25 pm -- Anne and I got a good view of comet Holmes.
Bob Steventon

THURSDAY NOVEMBER 1, 2007
BOB NELSON
Pamela,
Did the comet look like the enclosed image? I took it with my backyard 33 cm f/4.5 telescope (on a Paramount ME mount) using a SBIG ST-7XME CCD camera equipped with BVR filters here in Prince George Monday night around midnight.

See Bob's image in colour on page 4.

I hope that you and your friends can make it down to PG sometime -- you seem like a keen group!
BTW, I have no idea about the colour balance, other than it seemed to be strong in the blue.
Bob.

FRIDAY NOVEMBER 2, 2007
BRIAN BATTERSBY
I took a look at the comet through the big scope on Monday at the tour. It looked pretty cool. (we took a a few shots with the ST6) It was easily visible in the 3" finder too but not naked eye. Last night I viewed it naked eye from my home at 1st and Tabor. I viewed it with 10x50 and 20x80 binoculars too. It was very impressive. It has brightened a lot (a good 4 magnitudes) since Monday. Very weird comet as it is on the way out of the solar system.

Brian

SATURDAY NOVEMBER 3, 2007
DOUG WAYLAND

Hi All,

Comet 17P/Holmes continues to dazzle. The scene should become more beautiful as it approaches Open Cluster Melotte 20 toward mid month. Melotte 20 is the large "S" shaped group of bright stars around the Alpha star of Perseus, also known as the Alpha Persei Moving Group or Association. Wide field binocular views should give the best perspective on this.

Here is an updated finder chart from Skyhound.com that shows an enlarged map of the comets path through the area.
http://www.cometchasing.skyhound.com/comets/17P.gif

Doug Wayland

Lighting the future with Light Emitting Diodes (LEDs)

by Maurice Sluka

Amateur astronomers now have some good news. Effective, far more efficient and dark sky friendly lighting now available.

By doing a lighting conversion the city of Ann Arbor, Michigan (population 114,000) will reduce the city's production of carbon dioxide and gases that contribute to global warming in an amount equal to taking 400 cars off the road. It will be the USA's first city to convert all downtown streetlights to LED technology. LED's use less than half the energy of traditional bulbs and could save the community upwards of $100,000 a year.

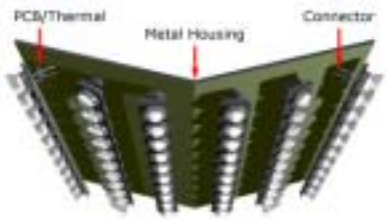
An LED consists of a semiconductor diode that emits light when a voltage is applied to it. From my research the replacement lights are to be ball type sidewalk lamps. This style of light is typically selected for its appearance during the day and not for its quality of lighting, but it's a start.

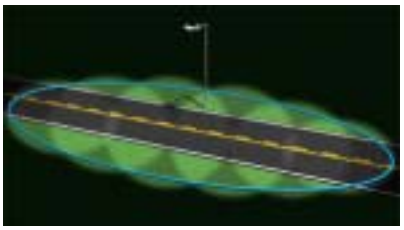
This is a tremendous opportunity to convince local municipalities and regional districts to replace all their streetlights and parking lot lights too in order to benefit from far less operating costs and energy use. Those cost savings and carbon reductions could tip the scale in moving provincial governments to take advantage of the more efficient lighting sooner.

Streetlights in use here in Prince George are typically high-pressure sodium (orange colour) 150 watts (6,900 lumens), but 100-watt bulbs (4,200 lumens) are also available.

The lights from Beta Lighting use 54 watts for 6,800 lumens, and 27 watts for 3,500 lumens, so the power required is nearly a quarter of the energy of a 100-watt bulb with nearly the same amount of light. This makes for power consumption reduction between 70% to 80%. The colour of the light is whiter and makes seeing easier, so the total light output does not need to be as high. The bulb lifetime is 5 to 20+ times longer than a traditional bulb so the maintenance costs are lower too.

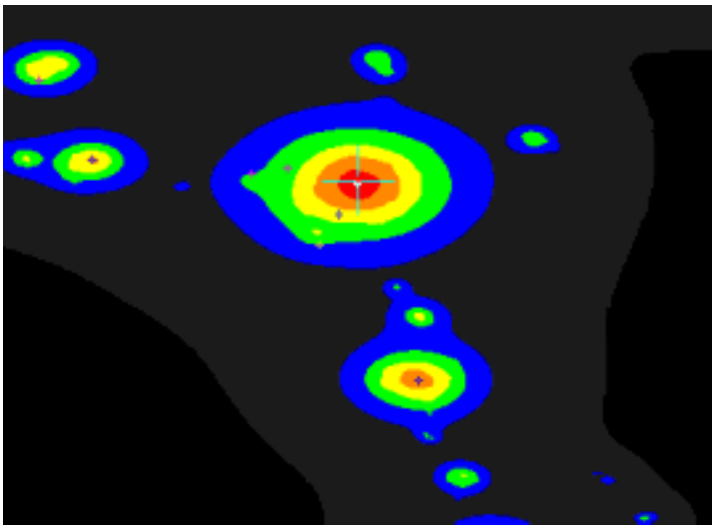
The image in the top right corner of the page is an example of the Beta LED 'THE EDGE' street & area light. The light's output is almost exactly the same as the 100 watt high-pressure sodium light. These are directional lights that don't waste light by shining it to the sky, or force you to look into the light source as you approach it.





The key to efficient lighting is to not waste the energy needed to make the light. Light fixtures should only be installed where needed and used when activity is taking place. For residential use a motion light with a timer is the best solution. Each time it switches on it signals to anyone within sight that someone is there. Lighting should shine the minimum amount required to the use the area lit. The light should be controlled to shine only within the area it is required, without causing a bright light source that you have to stare into while approaching. This can be done with a 'full cut-off' light fixture or a shield retrofitted to an existing light. Remember 'Lights down, Stars up'

Maurice Sluka



Light pollution map of Prince George, BC
Map from ClearDarkSky.com

The Red (Hot?) Planet

by Patrick L. Barry

Don't let Mars's cold, quiet demeanor fool you. For much of its history, the Red Planet has been a fiery world.

Dozens of volcanoes that dot the planet's surface stand as monuments to the eruptions that once reddened Mars's skies with plumes of glowing lava. But the planet has settled down in its old age, and these volcanoes have been dormant for hundreds of millions of years.

Or have they? Some evidence indicates that lava may have flowed on Mars much more recently. Images of the Martian surface taken by orbiting probes show regions of solidified lava with surprisingly few impact craters, suggesting that the volcanic rock is perhaps only a million years old.

If so, could molten lava still occasionally flow on the surface of Mars today?

With the help of some artificial intelligence software, a heat-sensing instrument currently orbiting Mars aboard NASA's Mars Odyssey spacecraft could be just the tool for finding active lava flows.

"Discovering such flows would be a phenomenally exciting scientific finding," says Steve Chien, supervisor of the Artificial Intelligence Group at JPL. For example, volcanic activity could provide a source of heat, thus making it more likely that Martian microbes might be living in the frosty soil.

The instrument, called THEMIS (for Thermal Emission Imaging System), can "see" the heat emissions of the Martian surface in high resolution—each pixel in a THEMIS image represents only 100 meters on the ground. But THEMIS produces about five times more data than it can transmit back to Earth.

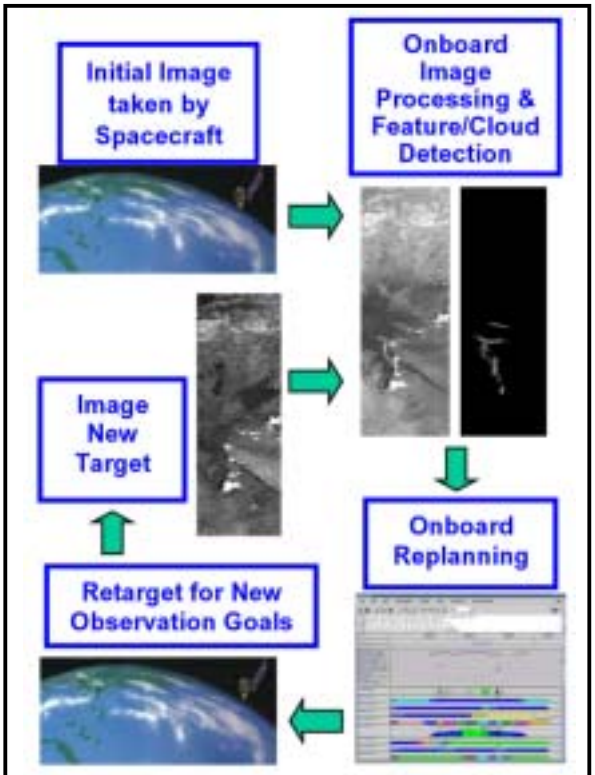
Scientists usually know ahead of time which THEMIS data they want to keep, but they can't plan ahead for unexpected events like lava flows. So Chien and his colleagues are customizing artificial intelligence software called ScienceCraft to empower THEMIS to identify important data on its own.

This decision-making ability of the ScienceCraft software was first tested in Earth orbit aboard a satellite called Earth Observing-1 by NASA's New Millennium Program. Earth Observing-1 had already completed its primary mission, and the ScienceCraft experiment was part of the New Millennium Program's Space Technology 6 mission.

On Odyssey, ScienceCraft will look for anomalous hotspots on the cold, night side of Mars and flag that data as important. "Then the satellite can look at it more closely on the next orbit," Chien explains.

Finding lava is considered a long shot, but since THEMIS is on all the time, "it makes sense to look," Chien says. Or better yet, have ScienceCraft look for you—it's the intelligent thing to do.

To learn more about the Autonomous ScienceCraft software and see an animation of how it works, visit http://ase.jpl.nasa.gov .



Just as changing cloud patterns on Earth were identified using Earth Observing-1's Advanced Land Imager along with ScienceCraft software, the THEMIS instrument with ScienceCraft on the Mars Odyssey spacecraft can avoid transmitting useless images.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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