

# STARDUST

Newsletter of the Royal Astronomical Society of Canada  
Edmonton Centre



December 2008

Volume 54 Issue 4



*Jupiter (upper) and Venus make a pretty pair just after sunset. Photo by Murray Paulson. Canon 40D, 17 to 85 zoom, iso 400, 8 sec @ 38mm f4.5*

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## RASC Edmonton Centre Contact Information

<b>Council Positions</b>			
<b>President</b>	<b>Krista Stefan</b>		
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New Member Advisor	Murray Paulson		
Dark Sky Preserve Coordinator	Sherrilyn Jahrig		
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<b>Appointed Officers</b>			
Editor	Michael Ward		
Web Site Coordinator	Ross Sinclair		
Library Coordinator	Roxy Garstad		
Equipment Coordinator	Dwight Hanson		

<b>Mailing address</b>	RASC Edmonton Centre c/o Telus World of Science 11212 – 142 St Edmonton, AB, Canada, TM5 4A1
<b>Centre Website</b>	<a href="http://www.edmontonrasc.com">http://www.edmontonrasc.com</a>
<b>Observing Deck</b>	452-9100 ext 2249
<b>Stardust</b>	Articles for Stardust may be submitted by email to <a href="mailto:mward@interbaun.com">mward@interbaun.com</a> . Submission deadline is the last day of the previous month (e.g. for the May issue submit by 30 Apr). Submit in any standard document format (MSOffice, OpenOffice, AbiWord, plain text). TimesNewRoman 10pt single-spaced is preferred. Don't bother with fancy formatting, odd spacing, strange fonts, etc.; it will only be discarded. Graphics (GIF or JPG please) may be submitted as separate files, and clearly identified.

**Edmonton Area Astronomy Discussions:** [astro@mailman.srv.ualberta.ca](mailto:astro@mailman.srv.ualberta.ca)  
**To subscribe send a blank email to:** [astro-request@mailman.srv.ualberta.ca](mailto:astro-request@mailman.srv.ualberta.ca)  
**with the subject line:** subscribe

*The above mailing list is completely independent and is not associated with RASC Edmonton Centre in any way.*

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## Upcoming Events, Meetings, Deadlines, Announcements

### Regular Meetings 2009

Telus World of Science, 11211 - 142 St, 7:30pm

Jan 12, Feb 9, Mar 9, Apr 13, May 11  
Jun 8, Sep 14, Oct 12, Nov 9, Dec 14

### Council Meetings 2009

ATA Building, 142 St & 111 Ave, 7:15pm

Jan 26, Feb 23, Mar 23, Apr 27, May 25  
Jun 22, Sep 28, Oct 26, Nov 23, Dec 28

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## GUEST SPEAKER, February 2009

**Robert Smith**, Department of History and Classics, University of Alberta, presents **The History of the Telescope: a Continuing Saga**. Professor Smith presented the first part of this

lecture in September 2008. See *Stardust*, Jun or Sep 2008 for the abstract of that talk.

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### The Planets by Murray Paulson

**Mercury** has come out of its late November Superior conjunction with the sun, and is now heading into the evening sky. It still is that same crumbly fall ecliptic that hangs so close to the horizon, but to make matters worse, Mercury's inclination places it 2 degrees below the ecliptic. This would be a really tough apparition if it were not for the conjunction of Mercury and Jupiter at the end of the month. From December 29th to January 1st, Mercury and Jupiter will be closer than 2.1 degrees apart, with the closest approach on the 31<sup>st</sup> of 1.2 degrees. With Jupiter close by, you should be able to sweep up the two planets in the twilight. Jupiter shines at Magnitude -1.9 and Mercury shines at magnitude -0.7. Mercury sets 1.5 hours after the sun, so get out there in the twilight with your binoculars / camera, and see if you can spot the pair. Mercury will be 2.1 degrees directly below Jupiter on Dec 29<sup>th</sup>, and will move up and to the south of Jupiter over the next few days until it is directly south of it on the evening of January 1<sup>st</sup>. A few days later Mercury is at greatest eastern elongation on January 4<sup>th</sup>. This is one of the shorter elongations, with the separation between Mercury and the sun being only 19.4 degrees. Mercury will subtend 7" at the time and show a 57% illuminated disk. Compare this to Jupiter's 32.6" disk. The two planets will be low, so Binoculars and telephoto lenses will be the favoured optic.

**Venus** and **Jupiter** have finished their dance, and Venus now continues up the sky heading for the Greatest Eastern elongation on January 14. This apparition lies low in the south west over the month of December, but as we leave Jupiter and Sagittarius behind, the ecliptic will carry Venus up into the sky. During the month, Venus brightens from magnitude -4.1 to magnitude -4.3 by the first week of January. Over this period, Venus expands from a fat gibbous disk of 17" diameter to a 25"-50% illuminated disk in mid January. Can you see it cast a shadow in the crisp winter evening?

**Mars** is behind the sun on December 5<sup>th</sup>, and will be lost in

the glare of the sun over the next few months. The conjunction marks the beginning of the long return to our night skies, a little more than a year hence to the next opposition.

**Jupiter** starts off the month in close conjunction with Venus, and it has spent the fall hanging low in the south west. I hope you have been watching Venus and Jupiter over the later part of November as they came together. We get a replay of this with Mercury at the end of December as our year end bonus.

The month of December affords **Saturn** observers with the opportunity to see the rings almost edge on. The opportunity comes with strings attached though. Saturn rises just after Midnight, so it is an early morning object, transiting the meridian at 6:45 am on Christmas day which happens to be near the minimum of the rings tilt toward us, .8 degrees. The New Year will see the rings tilt back up and the ring crossing happens at a most unfavourable time. It happens in September when Saturn is in superior conjunction with the sun. If you would like to see the inner moons Mimas and Enceladus, the next few months will present the most favourable opportunity to see them with a minimum of the deleterious effects of the rings glare for the next 15 years. The rings will tilt up quickly to 4 degrees over the winter months as we lead up to Saturn's opposition in March. Later in the year, in the summer time, the rings will tilt back down, but we will have the summer twilight running interference on us.

The outer Planets **Neptune** and **Uranus** are down in the evening twilight glare, but Venus does pay them a visit on its way up the ecliptic. Venus passes 1.4 degrees below Neptune on the evening of December 27<sup>th</sup>. Neptune will shine at magnitude 7.9 at the time, so it will take some effort to find it among the stars of Capricorn. Uranus is up below the circlet of Pisces, and will see Venus late next month, but more of that later. Uranus shines at Magnitude 5.9 and shows a 3.5" blue-green disk in the eyepiece.

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### Blotting out starlight: Upcoming Edmonton occultations: prime events by Alister Ling

We have a nice high probability asteroid event Monday evening Jan 5-6, at 8:16 pm. There is a 94% chance to see an 11.4 mag star drop 2.4 magnitudes for up to 5.1 seconds...from your backyard! Details on the web can be found at [http://www.asteroidoccultation.com/2009\\_01/0106\\_358\\_17137.htm](http://www.asteroidoccultation.com/2009_01/0106_358_17137.htm)

[http://www3.telus.net/public/aling/total\\_occultations/Edmonton%20Total%20Occultations.html](http://www3.telus.net/public/aling/total_occultations/Edmonton%20Total%20Occultations.html)

Unfortunately, the Pleiades occultation this month is barely before full Moon, so will not be very pleasing to watch, and besides, it's at 2 am. There is a graze some 49 km northeast of Edmonton on the Friday night 19-20<sup>th</sup>, at 3:55am, a 5.5 mag star

In any month, there are several dozen lunar occultations, with a handful of interest if you are at the deck. An abridged list (bright and easy and before 2 am) for events through October can be found at:

along the very rough south limb of the Moon. I'll post a map on my website with more details. Keep an eye on the email for updates.

Good observing!

I've really enjoyed crescent moon rises recently! Through binoculars it's fun to watch the shape morphing second by second due to atmospheric refraction. At my next session, I will be watching through my scope to get a closer view!

Before this, I have been listing the times to see very young and very old crescents. In particular these are challenging because the thin arc has to be visible against a bright twilight sky, yet not so low as to be lost through atmospheric extinction due to particulates, humidity, and thin cloud. With the nearly full Moon, the trick photographically is to take pictures while it is still daylight so the exposure is reasonable. It's neat to see a squashed pink or orange Moon close to the horizon. And of course I love to see a crescent filled with earthshine floating in a gorgeous twilight background suspended above the city skyline.

The crescent rises and sets add a new challenge for a couple of reasons. Firstly they require an additional 30 to 60 minutes to the event. For example, the crescent Moon at an ideal twilight time at the end of January is at 17:57 with an altitude of 7.6° and azimuth of 238.7°. It sets at 19:01, an hour later. By this time there is no colour left in the sky, but the refraction effects kick

in... at an azimuth of 252, more than 14 degrees farther along the horizon, hence the second challenge. A vantage point with a nice view of the crescent above one building might have other buildings or trees obscuring the set point, requiring a drive to another location!

On the other hand, including moonrise/sets on the observational menu means more dates on the calendar, which increases your chance of seeing something interesting in a clear sky. Especially with the Moon, any phase between 36 hours old and 36 hours before new offers a chance, at least when the ecliptic is not too low.

Don't miss the lovely conjunction of Jupiter and Mercury in the last week of December. They will be closest on New Year's eve but the highlight will be crescent Moon just above them on the 29<sup>th</sup>. The best twilight colours will be after 5:10 pm but Mercury will be only 3° up, so a good horizon is a must have.

The complete list is on my website: <http://www3.telus.net/public/aling/photosite/upcomingevents.htm>.

Below are the best ones; note that some are morning events and that there are no reflections of the sunrise from the buildings.



*Composite image of the crescent moonrise November 25<sup>th</sup>, 2008 by Alister Ling, taken from the east end of Jasper Ave. The exposures are exactly 1 minute apart, so the variation in position is due to atmospheric distortion!*

yyyy/mm/dd/hh:mn	Sol Az	Alt	Lunar Az	Alt		
2008 12 11 16 07	228.8°	-0.0°	56.4°	7.6°	99+	169.4°:
From Valleyview Drive CN tower is Az 60						
2008 12 12 08 49	131.3°	-0.0°	313.9°	2.3°	100+	176.8°:
From Cloverdale Hill bench this is above the Federal building						
2008 12 13 08 50	131.5°	-0.0°	301.3°	8.9°	98-	166.6°:

From Cloverdale Hill bench this is above the Manulife;  
sets at 10:16 az 318 to the right of the CN tower.

2008 12 23 07 54 119.7° -7.5° 158.1° 10.5° 13- 42.2°:  
From City Center Airport, just left of IPL Tower

2008 12 24 07 54 119.7° -7.5° 148.6° 4.9° 7- 31.3°:  
From City Center Airport, above Bell Tower, rises at 6:50 am Az 136  
to the left of CN Tower

2008 12 28 17 12 239.9° -7.0° 226.2° 1.3° 35h50m old  
From East end Jasper it sets behind the Telus building  
From McNally high school this is above the Muttart!

2008 12 29 17 17 240.7° -7.5° 219.3° 8.3° 5+ 26.5°:  
From East end Jasper this is above some apartments. Sets 18:42 Az 237  
behind the Manulife. From McNally high school sets over distant apts.

2009 01 11 08 53 14 128.6° 0.1° 302.1° 2.7° 100- 173.1°:  
From Connors Road trail head this sets in between the Enmax and Bell Towers.

2009 01 12 08 52 28 128.3° 0.1° 288.2° 6.0° 97- 159.1°:  
From Cloverdale Hill bench this is above the Edmonton Hotel  
sets 09:42 Az 298 into the Manulife

**Nomination Committee Report for 2008** by *Orla Aaquist and Sherry Campbell*

**Elected Officers:**

In accordance to the Centre By-Laws, please consider **Table I** below due notice of the 2009 slate of candidates for elected positions recommended by the 2008 nomination committee. Any other eligible member of the Centre may be nominated, from the floor, for any elected office at the Annual General Meeting (AGM) on January 12, 2009. In particular, at the AGM we will be actively seeking nominations from the floor for Vice – president, Co-National Representative, Public Education Director, and Observing Group Director for which the nomination committee was unsuccessful in finding willing candidates.

President	Sherry Campbell
Past-president	Krista Stefan
Vice-president	
General Secretary	Donna-Lee May
Treasurer	Mark MacDonald
Co-Nat'l Council Rep	Alister Ling
Co-Nat'l Council Rep	
Public Education Director (PED)	
Fundraising Coordinator	Franklin Loehde
Councillor	Bruce McCurdy
Councillor	Mike Noble
Councillor	Sheldon Helbert
Councillor	Harris Christian
Councillor	Peter Hall
Internal Communications Officer	Ross Sinclair
Obsers' Group Director	
Membership Secretary	Massimo Torri
New Member Advisor	Murray Paulson

**Appointed Officers:**

According to our By-Laws, within sixty days of the Annual General Meeting the new Council may, by ordinary resolution, appoint a member of the Centre to each appointed office. The list of appointed positions and candidates who have agreed to serve in these positions for one year starting 2009 is shown in **Table II** below. The new Council will have the task of filling the vacant positions indicated in the table, and members are encouraged to contact the new president after the AGM if they wish to volunteer for any of these positions.

Editor	Michael Ward
Web Site Coordinator	Ross Sinclair
Library Coordinator	Wally Anhorn
Equipment Coordinator	Dwight Hansen
George Moore's Workshop Coord	Sherry Campbell
Light Pollution Abatement Chair	Bruce McCurdy
Scope Rentals	Yves Lamarre
Scope Rentals - backup	
Speaker Coordinator	
Librarian (backup)	Mark Zalcik
Observatory Planning Committee Chair	
Outreach Coordinator	Dave Robinson
Deck Activities Coordinator	Cornelia Blunck
Astronomy Days Coordinator	
Public Relations Officer	
Social Director	
Stardust Distribution	Jesse Houston
Archive Liaison	
Dark Sky Preserve Coordinator	Sherrilyn Jahrig
2009 Auditors	

On Saturday, January 10, 2009, we kick-off the International Year of Astronomy (IYA) at the Telus World of Science. IYA is a year-long global event, officially declared by the United Nations to celebrate 400 years of the telescope. Across Canada, there will be thousands of special events, activities, and resources for professional and amateur astronomer. Throughout 2009, the Edmonton Centre and its partners, plan to draw on some of these resources as well as initiate our own unique activities. Our kick-off event is scheduled to coincide with the National kick-off, and you can visit <http://www.edmontonrasc.com/iya.html> for the latest details about this and other local events, as well as links to national and international IYA programs. The details of the kick-off event are not yet finalized, but event activities will be posted on our web site in early December. Throughout the year, we will be involved with a number of projects, including a local speaker series,

Galileo Moments, 400 telescopes, and 100 hours of astronomy. We are also hosting an IYA George Moores Astronomy Workshop, and we are actively working with other groups and our IYA partners to bring more, exciting IYA activities to the local community. All of these will be posted on our IYA web site at <http://www.edmontonrasc.com/iya.html> as they develop.

To make IYA a successful year of community astronomy, we will be looking to Centre members for help throughout 2009. To encourage volunteers, we have made a motion to Council to provide funds so that we can award IYA door prizes to our regular meetings, set up incentives for IYA volunteers, and promote IYA events within our community.

So get involved! Attend events, or help to plan them. Watch our website for regular updates and ways to get involved. Do not miss out! IYA2009 will be a year to remember.

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#### **4. Solar Induced Magnetospheres: Venus and Mars** by *Dave Cleary, the fourth article in this series*

Of the four terrestrial planets, Earth differs substantially from its two most comparable siblings, the hot house Venus and the sterile Mars. In contrast to Venus and Mars, the Earth demonstrates the renewing effect of tectonic activity. That activity is caused by internal convection that gives rise to the atmosphere protecting magnetosphere. Were it not for the magnetosphere life on Earth would not have been sufficiently protected from the ravages of the solar wind to allow the abundant complexity existing here. Neither Mars nor Venus has an active iron dynamo currently although apparently Mars did during its early development.

##### ***Venus***

Given the similarity in size between the Earth and Venus it was expected that Venus would in other ways be similar too. In fact it has proven to be quite different and a hostile place to boot.

Mariner 2 did not detect a magnetosphere in its flyby of Venus in 1962 at a distance of 6.6 Venus radii (6.6R<sub>v</sub>) from the planet. In 1967, data from Mariner 5 indicated a deflection in the solar wind consistent with an obstacle in the vicinity of Venus. Subsequent measurements by Venera 4 and Mariner 10 confirmed the results. The Venera 9 and 10 probes found evidence of a field structure extending from the night side of the planet unlike Earth's magnetotail and related instead to the interplanetary magnetic field. The Pioneer Venus Orbiter operating between 1979 and 1981 confirmed the absence of a significant native field, one that is approximately 10<sup>-5</sup> times that of Earth.

The observed deflection of the solar wind around the planet is believed to be due to the induction of a magnetosphere through the interaction of the solar wind with Venus' ionosphere. We shall see this again with Mars. The bow shock, the location where the solar wind's movement through space becomes significantly deflected, occurs proximate with the ionosphere but varies with the strength of solar activity. It is located at approximately 1.5 R<sub>v</sub>.

Why no dynamo? Gravitational information from probes, estimates of the planet's density, and the probable similarity of the formation of the terrestrial planets has led scientists to believe there is probably an iron core, but one that is not capable of producing a magnetic field for some reason. If Venus had a liquid core dynamo early in its life there is now no evidence of it.

Crustal rocks recording an early magnetic field when they solidified are unlikely to exist because surface temperatures are above the Curie limit at which rock crystals can retain magnetic records.

Speculation as to the lack of a native field includes contradictory ideas – that the core is solid, or that it is liquid at a uniform temperature with no convection inducing a field. Solid core advocates suggest the possibility that Venus' rotation at a rate of 243 days, approximately the same as its year (224 Earth days), does not provide sufficient solar induced tidal action on the planet to keep the core in a liquid state. Some posit that this does not exclude the possibility of a dynamo. The fact there is no evidence of tectonic activity suggests an insufficient level of convection that could otherwise induce a magnetic field. Perhaps heat trapped within the planet's core has no variable exit to the surface and therefore no differential motion causing induction.

There is evidence that both Venus and Mars started out with large amounts of surface and atmospheric water. Data from the European Space Agency's Mars Express and Venus Express have shown that the solar wind is stripping material away from the atmosphere, including whole atoms. The intensity of the solar wind appears to determine the rate at which the atmospheres of these two planets are eroded, with the rate at Venus being higher than at Mars. Did water escape the planet by this means?

##### ***Mars***

Mars has a very weak planetary magnetic field and sometimes Earth level local magnetic fields, primarily found in the southern hemisphere. Investigations of the Martian magnetic environment began in 1964 with the Mariner 4 flyby that detected a bow shock.

Phobos 2 and Mars Global Surveyor confirmed details of the bow shock located close to the planet's surface at approximately 1.5 R<sub>m</sub> indicating that it was related to interaction between the ionosphere and the solar wind. The ionosphere presents itself as an obstacle to the solar wind creating an electrical interaction like that at Venus. Also like Venus, a second object - a Magnetic Pile-up Boundary similar to that detected on comets Halley and Grigg-Skjellerup - has been found where strong and very organized fields occur due to the piling up and draping of the interplanetary magnetic field around the planet.

Remnant crustal magnetic fields have been detected from

orbit indicating strong magnetic fields in the planet's past, in some cases as strong as fields found on Earth. These local fields are banded similarly to those associated with tectonic activity on Earth. They are also stronger in the southern hemisphere to the extent that the northern hemisphere experiences direct bombardment by the solar wind. The north south variation appears to affect the magnetosphere as evidenced by bow shock variability in the southern hemisphere compared to the smoother texture of the field in the northern hemisphere. This may be due to the interaction of localized crustal magnetic fields with the interplanetary magnetic field. The local fields also show evidence of polar wandering, which one would expect to find with a dynamo similar to the Earth's.

Together the evidence points to a magnetic dynamo sometime in the distant past. Old craters in the north show low levels of magnetism placing the active dynamo effect prior to creation of the craters over 3 billion years ago. It's estimated that Mars lost it's magnetosphere about 4 billion years ago.

NASA scientists used Doppler tracking of radio signals to identify a bulge at the equator of Mars consistent with the presence of a liquid iron core and have estimated it has a relatively high content of sulfur and lighter elements. Like Venus it is unknown why the core does not produce a significant magnetic field. The lack of tectonic activity on both Venus and

Mars support the notion that there is insufficient convection at the core to induce the field. The current strength of Mars' small magnetic field puts it at approximately  $10^{-4}$  times that of Earth.

Mars is perhaps the best example of the action of the solar wind on a planet without a strong magnetosphere. Evidence for the past existence of large amounts of water on Mars is quite strong from the recent spate of orbiting and ground based research projects at the planet, most recently from the Phoenix Mars Lander. The "follow the water" strategy of NASA research projects underscores the question, "Where did the water go?" The atmosphere of Mars is very different from both Venus and Earth, only 1% of Earth's atmospheric pressure at the surface. The Mars and Venus Express programs have both identified the depleting effects of the solar wind on the atmosphere of both these planets. Without a strong intrinsic magnetosphere, the atmospheres of both planets have suffered significant losses over time.

The next article on magnetism in the solar system moves to the gas planets and the interesting dance of the moons within their fields.

*Dave Cleary has been fascinated by the nature of Earth's biosphere in an otherwise unforgiving space environment. He believes that the discovery of beach umbrellas on Mars would provide irrefutable proof of Mars' watery past.*

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### **President's Report by Krista Stefan**

Flyin' Fireballs, Batman!

Well, there certainly has been a bit of excitement around the past little while. Amazing what a bright meteor at rush hour can do to bring Astronomy into the public eye for a few days. Congratulations to all the successful meteorite hunters who managed to locate bits of space rock!

We're coming up to the holiday season, when all Edmonton

- The President's Award for Service to the Centre
- The Observer of the Year Award
- The Angus Smith Award for Excellence in Telescope Making and Design
- The Bryce Heartwell Memorial Award for Excellence in Astroimaging
- The George Moores Memorial Award for Excellence in Public Education
- The Franklin Loehde Award for Project of the Year

The Awards Committee would be happy to hear suggestions for these awards. Please send your suggestions to me by December 15<sup>th</sup>. Previous winners of these awards are listed on the Edmonton Centre webpage.

In the regular portion of the January 12<sup>th</sup> meeting I'm working on getting some of our intrepid meteorite adventurers to share their experiences.

Also keep in mind that 2009 is the International Year of Astronomy, and our IYA committee has lots of activities over the coming year. Orla has a report on IYA elsewhere in this edition of Stardust. Remember that the activities are starting with a kickoff event at the Telus World of Science Edmonton on

RASCals thought turn to visions of our AGM .... well maybe not. But I would like to remind the members that our Annual General Meeting is coming up on January 12, 2009. In the AGM portion of the meeting, the elections for the majority of council positions (which are coming vacant at the end of their term) will be held. A list of the Nomination Committee's nominations is included in this issue of Stardust. I will also have the honour and privilege of presenting the Centre's annual awards. These awards are:

January 10, 2009. Frank Florian has invited members to set up their telescopes in the lobby during the day to show visitors the variety of telescope now available as compared to what Galileo had to work with. Members are also invited to set up telescopes outside in the evening to begin a year of providing people with their own "Galileo Moment".

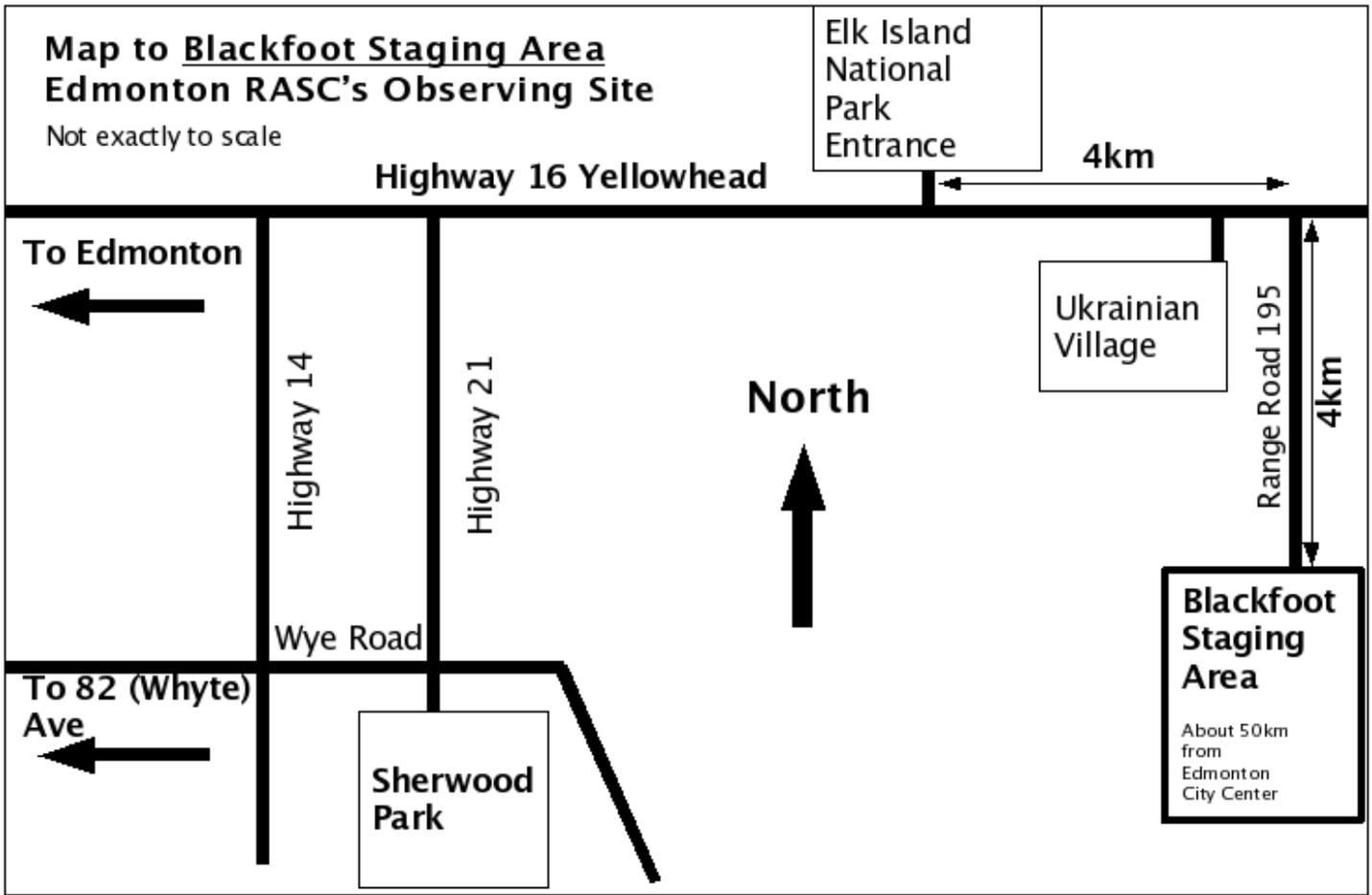
That's about it for this year. I look forward to seeing everyone in the New Year, and at the risk of being politically incorrect:

Merry Christmas to All, and to All a Clear Night!

**Murray bags a Meteorite:** *Murray Paulson found a 5 gram piece of the rock that fell on Nov. 20, on crown land, lucky fellow.*

The GPS reads: N 52° 59.359  
W 109° 48.183





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