



Astronomy News for Bluewater Stargazers
Vol 8 No. 2 Feb 2014

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Astrophoto Contest

Entry deadline for the BAS Astrophoto Contest is **Mar 26, 2014**. Prizes will awarded in each of the following categories:

1. **Deep Space (DS)** (i.e. long exp/stacked/ major image proc.)
2. **Lunar / Planetary (LP)** short exp. Moon/planets thru scope
3. **Unguided Tripod (UT)** tripod photos, no guiding
4. **Best cellphone**, tablet/point and shoot camera image (CP)
5. **Best U18** photo taken by a person under age of 18. (U18)

See **BAS website: BAS FORMS** for complete rules.

Prizes include: (see images below)

1. (Deep Space) Celestron 15x80 Skymaster Binoculars
2. (Lunar/Planetary) Kaguya Lunar Atlas
3. (Unguided Tripod) Starry Night Complete Space/Astr. Pack
4. (Cellphone) Beginner's Guide to DSLR Astrophotography
5. (U18) Meade "Seasonal Star Charts"



Ashley Parks drew this image of comets in the vicinity of the Sun back in 1997. She may or may not have been depicting the appearance of the two comets visible about that time -Comet Hale-Bopp and Comet Hyakatake. At the time, it was rare to have two bright comets visible to the naked eye over such a short span. I wonder what her picture would have looked like this past year when there were 4 comets visible in the morning sky? And when one faded away others appeared as replacements. The list in 2013 includes PanSTARRS, Lemmon, ISON, LINEAR, Lovejoy, Encke, Nevski and Brewington. Although none of these got to be the brightness of Hale-Bopp or Hyakatake (the brightest comets I have ever seen) several 2013 comets were visible in binoculars and even to the naked eye in dark skies. What a year was 2013!

Elvira: Now and Then

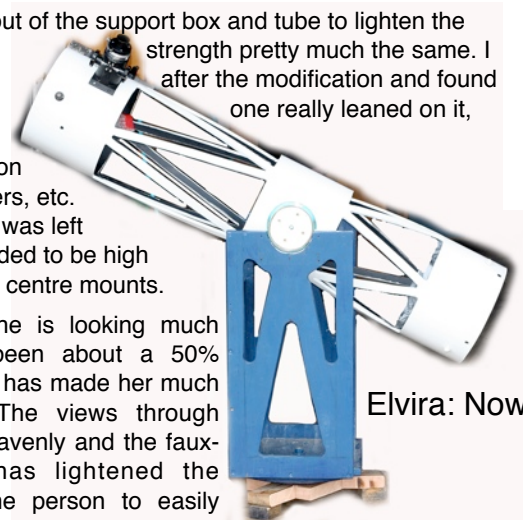
Two elementary students pose with our club 8-inch dob, (known then as "Elvira: Mistress of the Night") as she was originally built. The tube was 1/2" thick plastic pipe that required two people to carry and a third had to struggle with the base, -not the most convenient telescope to use. She was grossly over-weight!



Elvira: Then

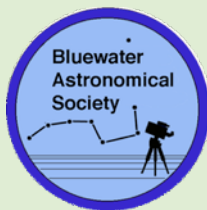
Elvira was long overdue for a weight-reduction and this past fall, it finally got done. There were two phases: replacement of the swivel base with a ball-bearing arrangement that can be adjusted for tension by simply tightening the hold-down nut and cutting triangular sections out of the support box and tube to lighten the load while keeping the strength pretty much the same. I tested the tube strength after the modification and found that it did bend a bit if one really leaned on it, but the tube was rigid enough since the loads on the structure from focusers, etc. are pretty low. The tube was left intact where rigidity needed to be high i.e., at the two ends and centre mounts.

If I say so myself, she is looking much trimmer. There has been about a 50% weight reduction which has made her much easier to transport. The views through "Elvira Lite" are still heavenly and the faux-truss tube design has lightened the telescope to allow one person to easily carry both pieces. Handles will be provided in the appropriate spots.



Elvira: Now

Disclaimer: StarGazer News reports on the activities of the Bluewater Astronomical Society (formerly Bruce County Astronomical Society) but any opinions presented herein are not necessarily endorsed by BAS. See the BAS website at www.bluewaterastronomy.info for up-to-date details relating to BAS events. The BAS weblog is back, with articles of immediate interest written by various BAS members.



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BAS Executive 2013-2015

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Next BAS Meeting March 5, 2014

NOTE: BAS does not meet in January or February due to the generally poor winter driving conditions. Our next regular meeting takes place at the Grey Roots Museum at the usual time on March 5, 2014.

However, impromptu viewings still go on at the Fox Observatory as weather permits. Regular members receive notifications of these (usually fairly short notice) as they occur. If you are not a regular member and are would like to be on the notification email list please send a short note to John, Aaron or Brett at one of the emails listed in the BAS Executive box above.

BAS executive for 2013 to 2015 is:

President:	Aaron Top
Vice-President:	John Hlynialuk
Secretary:	Lorraine Rodgers
Treasurer:	Cheryl Dawson
Past-President:	Brett Tatton
Past-Past President:	Dan Gieruszak
Membership Chair:	Dave Skelton

From the "Top" by Aaron Top, President, BAS

The Quest For Barnard's Loop

Finally !!! a clear winter night worthy of some deep space astrophotography. Temperature.. -20 or 30 ... Ridiculous! First things first.... LONG UNDERWEAR !!! no jokes about this one guys...pants, two layers of socks + warm thermal socks over top, thermal turtle neck with t-shirt over top... than long sleeve shirt.. hoodless sweater, a hoodie and that's only just the start! Snowpants, winter coat, toque and warm, warm, warm gloves that can work a camera. It doesn't take long for your fingers to freeze!

The Ordeal Begins: One of my long time goals has been to photograph Barnard's Loop, the reddish arc or curve invisible to the naked eye that surrounds the constellation Orion.

My night started as usual: set up of my gear, everything running and working well, run some test shots... Good to go! It was freezing, did I mention that? I switched back and forth between wide-field 18 mm lens and 70-300 telephoto lens before finally deciding that wide-field was much more manageable in the cold. By this point Orion was exactly where I wanted him positioned in the sky! I set up my shots using my remote timer and managed to track up to 8 minutes.

After making battery changes, adding dew heaters, blow drying and other minor adjustments...success. Barnard's Loop taken both close up and wide-field using the same zoom lens 18-85mm. The night was basically over until an outburst of light pillars occurred. I called it a night shortly after they disappeared. [See the BAS weblog for more on light pillars including a set over the entire city of Owen Sound.-ed]

Aaron



Aaron Top image: Orion and Barnard's Loop taken with Canon 60Da 18-85 mm lens set at 33 mm, f/4.5 ISO 800, exp. time - 310 s. Barnard's Loop is most obvious to the left of Orion's Belt.

Jan 26 (Sun) **graze of nu-Sco** Viewing at Fox cancelled due to weather.

Feb 1 Sat (NM+2) **BAS viewing@Fox** viewing at Fox weather permitting. Details will be sent to members by email.

Feb 3 Mon (FQ-2) **Mercury and Neptune** closest in West sky after sunset only 2° 33 min apart. **Uranus and crescent Moon** closest (2° 9 min apart) just above Mercury/Neptune.

Feb 6/7/8 (FQ+...) **Comet Lovejoy (mag 6?) and LINEAR (mag 10?)** about 2° apart in morning sky.

Feb 14 Fri (FM) ☾ **Full Moon** "Snow Moon" ♥ Valentine's Day

Feb 19-22 (LQ-3) **Saturn, Spica, Mars, Moon** in nice group in Wed --> Sat dawn sky.

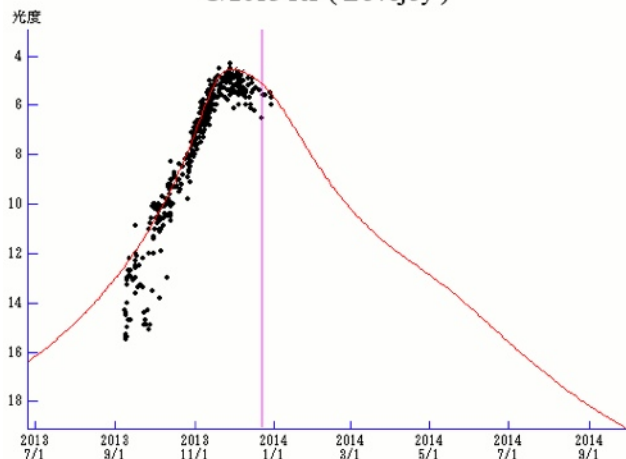
Feb 26 Wed (NM-2) **Venus near thin crescent Moon** in dawn sky before sunrise.

Feb 27 Thu (NM-1) **Mercury near thinner crescent Moon** in dawn sky before sunrise.

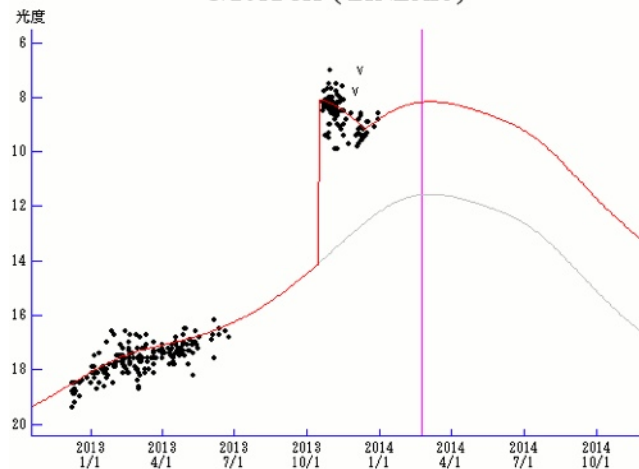
February Comet Update

Comet Lovejoy (C2013 R1) is still basically the only bright comet left in the sky (it may be still visible in binoculars) although 3 others are only visible in telescopes. C. LINEAR (2012 X1) is not really a close second to Lovejoy but, as it turns out this month, both are close to each other in the sky. See finder chart at right for Feb 8. Seiichi Yoshida www.aerith.net/ has created light curves for Lovejoy and LINEAR incorporating recent observer estimates and they are provided below. Note the dramatic increase in brightness of LINEAR when it erupted in Oct last year. Finder charts for both Lovejoy and LINEAR (and the "also-rans" below right) are found on the BAS website.

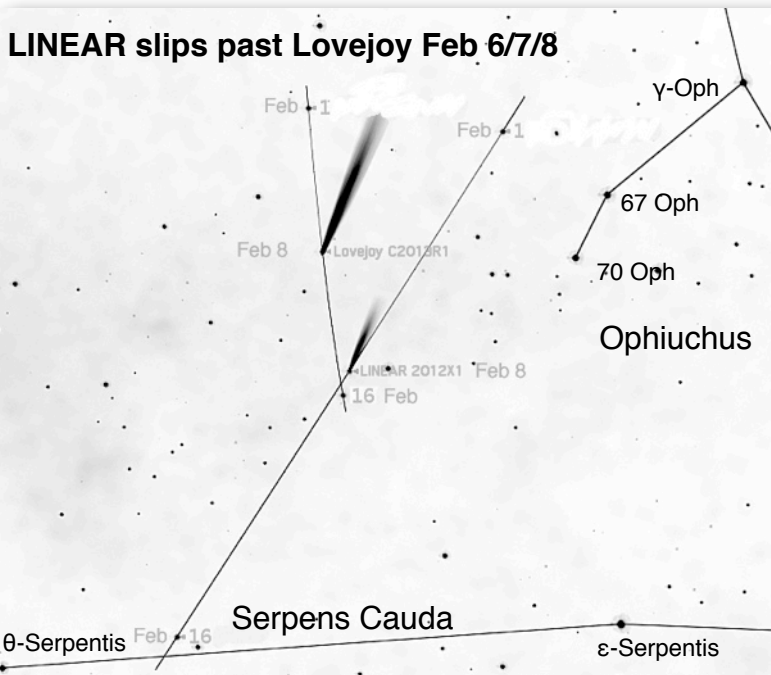
C/2013 R1 (Lovejoy)



C/2012 X1 (LINEAR)



BAS/Astronomical Events Feb 2014



If you look for the magnitude 6 comet C. Lovejoy on Feb 7, you will find C. LINEAR just 2 degrees away shining at a much fainter magnitude 10 or so. Lovejoy should be much easier to spot than LINEAR but maybe an image may pull out the faint glow of LINEAR from the background. Recent brightness estimates show it is close to the red curve (diagram lower left) and is maintaining its magnitude 10 brightness into Feb and possibly March. Lovejoy on the other hand appears to have reached its peak and has faded to about magnitude 6 from its brightest at magnitude 4.5 or so.

The "also-rans":

The two brightest comets (if you can call them that) after Lovejoy and LINEAR are **154/P Brewington** and **C. Nevski (2013 V3)** and technically are included in the list of comets that can be seen in our sky presently. However, they have not drawn much media coverage, since they have not reached naked eye brightness and are tough even in binoculars. **Brewington** has barely struggled to get above magnitude 10 and is less than that now. It has reached perihelion and is now expected to fade from view and attention.

Nevski appears to have experienced an eruption (like Holmes and LINEAR) and is now similarly fading out post-perihelion. Early January estimates of brightness were magnitude 10 and dropping.

Even if a comet becomes visible to the naked eye, it takes a lot more to make it a memorable comet (Comet of the Century?) like Comet McNaught (C2006 P1) was in 2006. Hale-Bopp in 1997 was a close runner-up. (Comet Kohoutek, on the other hand was memorable for its lack of a good showing.)

The Minor Planet Centre (which keeps track of comets among other objects) lists dozens of comets that are visible at a given time, but only a small number are 10th magnitude or brighter. Comets need to be around 8th magnitude to be barely visible in binoculars and above 5th magnitude to be visible to the naked eye. Although some of the comets of 2013 were wonderful photographic comets, none were comparable to 1996/1997 when Comets Hyakutake and Hale-Bopp were easily visible to the naked eye or McNaught which unfortunately for us was a southern hemisphere sight.

Although I try to keep politics out of this newsletter, every once in a while I like to publish what I call a rant. As a former science teacher, I have found a subject close to my heart: Harper's Science Policy.

CBC's "fifth estate" episode Jan 10: "Silence of the Labs" <http://www.cbc.ca/fifth/episodes/2013-2014/the-silence-of-the-labs> is a must see if you are in any way suspicious of the Harper government's attitude toward scientific research in Canada. I have been following some of the developments recently since my son and daughter-in-law have been dropped into the middle of the cutbacks to fundamental research that our PM and his reform-minded (read Philistine) gang of ministers and advisors have foisted on our country. My own son and daughter-in-law have gone to the USA to seek a better climate towards fundamental science research in which to pursue their scientific careers. Meanwhile in Canada, scientists doing basic research at the federal level are being axed left and right.

Virtually every department doing federal scientific research has suffered cutbacks or else funding has been totally removed and the institutes have been shut down. Examples include many programs that were monitoring the health of our environment and providing data to government that would in other times have been guides to the formation of government policy. See this link for a list: <http://www.cbc.ca/fifth/blog/federal-programs-and-research-facilities-that-have-been-shut-down-or-had-th>

The insidious thing about this is that the government has crippled the ability of many organizations, among them those that reported to the Canadian public about hazardous chemicals in our environment and also about water quality, toxic chemicals in our oceans, air pollution, emissions from industry, etc. Where scientists continued to provide such information (at conferences of their peer organizations, for ex.) Canadian (and only Canadian) scientists were required to have their answers to questions approved by a government media consultant. This appointee was in attendance watching over them to make sure Canadian researchers were "sticking to the government message" aka "science policy" (read Conservative government policy). The example that stands out starkly is International Polar Year Conference in April 2012 in Montreal. See this report among others: <http://www.cbc.ca/news/technology/federal-scientists-closely-monitored-during-polar-conference-1.1248559>

Canadian scientists attending this conference were justifiably embarrassed at this government's interference in open scientific debate at an international level. (As a Canadian, so am I.)

The Harper government justifies all these cutbacks, restructuring, and watch-dog tactics, by stating that their priorities are on funding science that has foreseeable economic results or that provides economic development of Canadian resources to keep Canada prosperous on a global scale. Hence, Harper's push for oil-sands development and Arctic sovereignty among other initiatives. Basic research, clearly, is not at the top of this government's list since they can see no obvious benefits to it. One has to wonder if they have ever read a book on the history of science. Apparently they have no knowledge of the countless times a scientist has discovered something that eventually led to huge economic benefits. Do the Harper folks not know about Faraday's discovery of the motor principle, or the accidental discovery of penicillin by Fleming, or the pacemaker (Greatbatch)? Need I quote again Faraday's remark to critics questioning the usefulness of several areas of his research (including electromagnetism)? Faraday replied: "What use is a new-

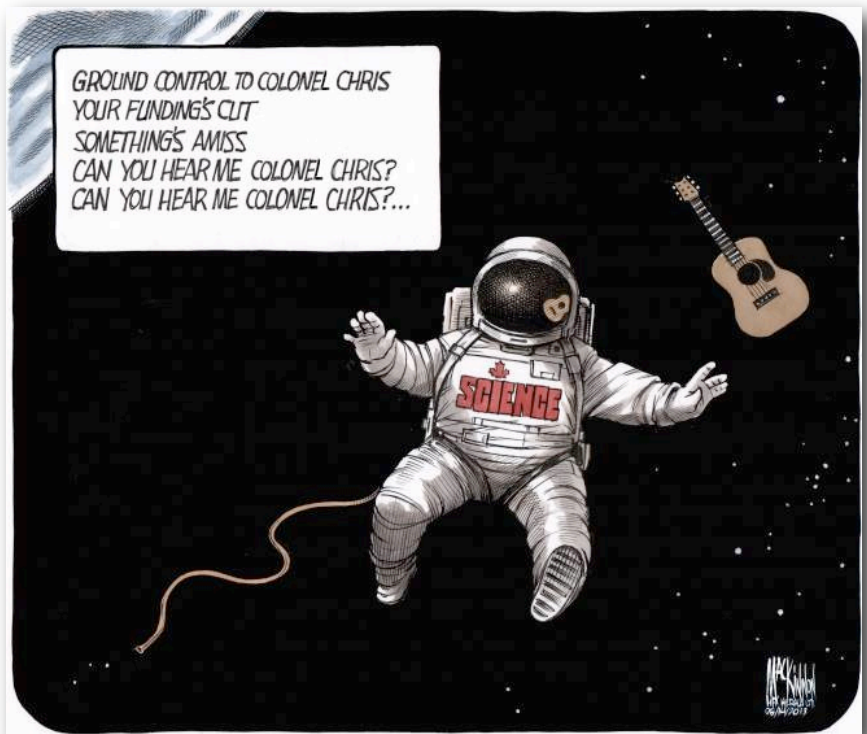
borne infant?" (The quip was used on other occasions by others, including Benjamin Franklin.) See this link for more: <http://www.geniusstuff.com/blog/list/10-accidental-inventions/>

The simple fact is that it is impossible to predict an economic benefit from a discovery in fundamental science (who predicted the many uses of lasers when the principle was demonstrated in a ruby crystal? or the cell phone as an application of electromagnetic wave transmission through space?) It is even more impossible to plan research with the intent of finding new principles that lead to new devices or processes unless you can see into the future. Without this crystal ball, how is it possible to predict where economic benefit lies?

The simple answer is that it is not possible to predict important discoveries that lead to economic benefits, and I suspect the Conservatives know this. What their agenda is, and what their science funding policy is justifying, is the rapid and uncontrolled development of Canadian resources, (oil sands, mineral ores, timber, agricultural products, etc.) to satisfy the demands of the corporations that are for the most part controlling this government in order to maximize the profits of those corporations. Federal scientists, action groups like environmentalists, organizations promoting clean air, water and land on which to raise our crops to feed our children, stand in the way of development. This government has effectively circumvented the rights of Canadians to have a decent environment along with economic growth and the first group to go are the "canaries in the coalmine", i.e. federal scientists studying the environment. Cutbacks have been made as well on native rights and women's issues. Check the link provided below to see the extent of the intrusion into those areas.

The link below provides a comprehensive listing of articles, stories, etc. compiled by John Dupuis in his Confessions of a Librarian blog. It is well worth skimming through to see how the Conservative agenda has unfolded over their mandate. Especially read the comments for personal horror stories.

<http://scienceblogs.com/confessions/2013/05/20/the-canadian-war-on-science-a-long-unexaggerated-devastating-chronological-indictment/> Send a note to your local MP if you are as outraged as I am.



Regulus to be Occulted by Asteroid: IOTA looking for observers to time event

From IOTA website: <http://occultations.org/regulus2014/>

On March 20, 2014 shortly after 2AM EDT anyone standing outside under clear skies and looking to the west in a large swath of New York State (ranging from Long Island all the way up to Oswego) as well as portions of New Jersey, Connecticut, and Ontario (and on the island of Bermuda as well) may see the bright star Regulus completely disappear from view for as long as 14 seconds as the asteroid (163) Erigone passes in front of it. An event like this is called an occultation, and the [information] you are now reading will try to provide answers to some basic questions along with information on how you can observe and contribute to the scientific study of this exciting event. IOTA wants your help, and by reporting your observation (even an "I did not see the star disappear from my location" report) you will be adding to the scientific knowledge about this asteroid. This page will try to give you an easy-to-understand introduction to the event is and how to observe it.

What will happen on March 20, 2014 around 2:00 am EDT, and why is it so special?

The ~45-mile (72 km)-wide asteroid Erigone will pass in front of a very bright star (Regulus). The star is easily visible to the naked eye from all but the most light-polluted areas. Since the asteroid is much

too small and dark to be visible, for people standing in the path of the asteroid's shadow one of the brightest stars in the sky will simply seem to disappear from the sky for up to 14 seconds.

Since Regulus is about 4 million times farther away from us than the asteroid, you can imagine that many factors need to be properly aligned for this event to be visible from our planet. First the asteroid must pass in front of the star. Then the shadow of the asteroid must fall on Earth in an area where it is night, and of course the sky must be clear (frequently not the case in March in the northeast).

Next the orbit of the asteroid and the location of the star must be known with sufficient accuracy for the prediction of where on Earth the shadow will pass to be made with some reasonable amount of certainty. (For example, a prediction that said the shadow would pass "somewhere over the continental USA on March 20th" would probably not be worth getting out of bed for!) IOTA makes every effort to use all available information from NASA and other sources to make our predictions as accurate as possible. The prediction for Erigone and Regulus is expected to be extremely accurate.

For many people, viewing the occultation of Regulus may be a once-in-a-lifetime event, similar to a solar eclipse but of a more subtle

nature. Regulus is easy to see in the sky "naked eye" and you have probably seen it there many times without even knowing it. We usually have to wait many years before any particular asteroid passes in front of a star bright enough to easily be seen without a telescope. The temporary disappearance of a star as bright as Regulus behind an all-but-invisible asteroid is thus a rare and beautiful occurrence.

Here is a link to the IOTA path prediction for the event: [Erigone/Regulus Path Prediction](#)

Here is a link to a google map version of the IOTA path prediction: [Erigone/Regulus Path Google Map](#). You may drag and zoom on this map as you would on any Google map. The map shows a green line, two blue lines and two red lines. If the asteroid's shadow followed its most likely central path (the green line) exactly, it's edges would follow the two blue lines. However since there is some uncertainty in where the actual central path will go, the red lines identify a slightly larger zone in which there is a 66% probability that the edges of the shadow will pass inside (the 1-sigma uncertainty zone).

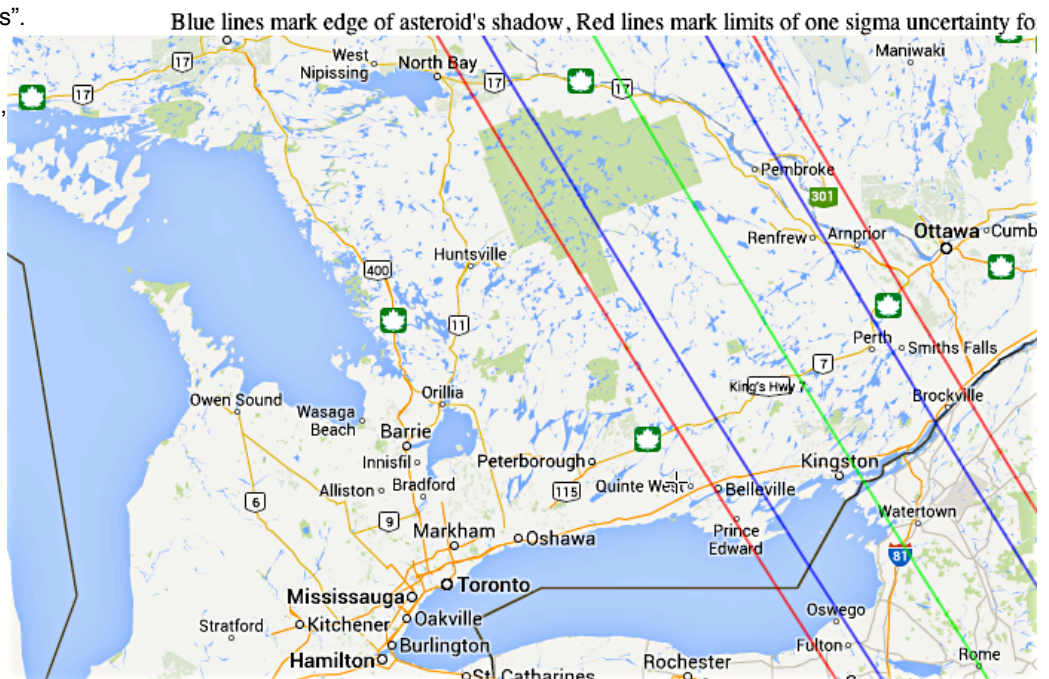
[The full document from which the above was extracted see: <http://occultations.org/regulus2014/>]

What to report:

- 1. Your Location:** Accurate GPS coordinates or lat/long from a Google map.
- 2. Start and stop times** of the Disappearance and Re-appearance; if none, indicate: "Miss". See <http://occultations.org/regulus2014/> for more information and alternate ways to record including videocams, SW radio timing, etc.

The Google map right has the region of visibility (blue lines) plotted on it with the centre of the track in green. Red sidelines show the possible error in the ground track on either side of the central line. The Trans-Canada Highway (Hwy 7) from Peterborough to Ottawa crosses the track perpendicularly. Similar highways south of Algonquin Park also traverse the track and are a bit closer to Bruce-Grey. Highway 60 through the south end of Algonquin Park to Renfrew is also well-placed for observations. Weather will determine the best location in Ontario, of course. Observers from Bruce should be prepared for a long day of travel or overnight stay after the 2:00 am event. Note that the ground track passes centrally over Kingston and the Yarker home base of SkyNews.

Ground Track of Regulus Occultation by Erigone Mar 20, 2014



A Lifetime of Sharing the Grandeur of the Heavens

John Dobson (Sept 14th, 1915 - Jan 15th, 2014)

“ There is so much out there to see and wonder at; and so many questions to ask. How did it all begin ? Where is it all going ? ”

“ No, Im not going to retire ! This is what I love to do. Show people the Universe. ”
-John Dobson Describes his Life's Work



John Dobson died at 98 years, young in spirit. He brought the wonder and poetry of the cosmos to the public in a way that had few equals, and his life served as an inspiration for thousands of amateur astronomers around the world. He has been called the “Pied Piper of Astronomy”, for his astronomy outreach, and the “MacGyver of Telescope Making” for his creation of an inexpensive, easy to use, reflecting telescope, which now bears his name, the Dobsonian. I met John Dobson during two days in June, 1985, when he was invited to present his controversial views on cosmology at the Ontario Section of the American Association of Physics Teachers (AAPT) during our annual meeting, held that year at McMaster University. I remember his unconventional lecture, and its reception by the assembled physicists, was unenthusiastic. It ended with puzzled looks and there were few questions. Simply put, John Dobson advanced a scientific paradigm that was not widely shared by the scientific community. He didn't believe in a Big Bang origin of the Universe; instead, he believed in an infinite, eternal universe, essentially changeless in its underlying gross structure. In a later interview for Space.com, he was quoted as saying : ***“ If the world is indeed apparitional, then underlying it there must exist something which is not in space and time, and which must be changeless, infinite, and undivided.”*** Pretty heavy stuff! However, Dobson is famous and loved, not for his perspective on the origin, foundation, and evolution of the Universe, but for his dedication to showing the wonders of the Universe to everyone who wished to experience them. In that area, his education efforts have touched the lives of literally thousands of people !

John Dobson earned his Master's degree in Chemistry from the University of California, Berkeley, in 1943, and promptly was recruited into war research on the Manhattan Project. In 1944, he heard a lecture by a Vedantan monk that opened his mind to a different perspective on reality. The term “Vedanta” means “culmination of knowledge”, which resonated with Dobson,

and sheds some light on his future cosmological theories. He joined the monastery in 1944 and was given the assignment of reconciling his scientific world view with that of Vedantan



philosophy. As a boy, he had always harboured a fascination for the night sky. So now, as he pursued his assignment, he wished to build his own telescope to see for himself the celestial wonders of the night sky.

To build a telescope within a monastery, that had few resources, Dobson had to be creative and scavenge for parts. He built his first telescope around 1956. It was a 12 inch diameter reflector, using leftover pieces of plumbing supplies, cardboard tubes, eyepieces from broken binoculars, plastic from damaged long playing records, and two pieces of porthole glass which he used to grind the mirror. When he finished his telescope he turned it toward the First Quarter Moon, where the terminator highlighted impressive mountainous and cratered detail, and he thought, *“My God, it looks as if I am coming in for a landing! Everyone must have the opportunity to look through a telescope and see this!”* Dobson's mount is the essence of simplicity; the telescope tube is made of a cardboard sonotube which is supported by a plywood mirror box sitting on a plywood ground board. The whole telescope articulates in altitude and azimuth on simple teflon

bearings. Much later, after literally thousands of Dobsonian telescopes had been produced, he was asked by interviewer, Andy Poniros, (a JPL public outreach volunteer), where he got the idea for his simple, easy to point, alt-azimuth Dobsonian mount. Dobson responded; *“I designed the mount to move the way cannons go. If you want to aim at the sky you have to go round and round, and up and down .. there is nothing else you have to do. We don't have to use all that complicated machinery; we just push the the thing by hand.”*

John Dobson left the Sacramento Vedantan Monastery in 1967 and

moved to San Francisco where, along with two friends, he started the San Francisco Sidewalk Astronomers, which would realize his dream of showcasing the wonders of the Universe to the public. John described the early history in an interview with Owen Hoffman in 2004. *“We are a public service organization. What we do is get telescopes out for other people. We almost never set up a telescope to look through it ourselves. But when we run it for the public we do get to see things for ourselves.”* Gradually, Dobson and his small band of amateur telescope makers gained recognition. It was in 1971 that Dobson and Brian Rhodes completed a 24 inch Dobsonian telescope with a mirror so finely figured that it could reveal the entire surface of the Red Planet. This telescope was huge by amateur standards and justified a dark sky site to really perform. It was this telescope that really helped make the San Francisco Sidewalk Astronomers so well known; indeed, it was hauled more than 128,000 km on public outreach trips. They began to visit the great National Parks of the SW to showcase the heavens for the public; parks like Death Valley National Monument, Yosemite, and Grand Canyon National Park were visited many times. Indeed, their small group has

John Dobson: A Lifetime of Sharing (cont'd)

visited over 12 National and State parks and travelled from Canada to Mexico to showcase the heavens.

After I heard about John Dobson's passing, I contacted my friend, Steve Dodson from Sudbury, who personally knew John Dobson. Steve kindly recounted some of his memories of John Dobson.

John had visited Steve and his family after the 1985 McMaster AAPT-Ont Conference. Steve recounted, "Where does a famous astronomer sleep? John declined the spare bedroom and declined even a sleeping pad, blanket, or pillow. He slept on his back on the living room floor, cushioned only by the carpet. Perhaps the level of comfort he was accustomed to in his monastic days in California. Later, during a visit to the Sudbury Science Centre, he noticed a huge 29 inch pyrex mirror blank sitting idle. He gave us our marching orders. We had to get a matching steel disk cut and we needed to visit a local granite shop to obtain the coarse abrasive so we could grind the mirror on the steel. Everyone on the patio

next to the Science Centre cafeteria, visitors and staff alike, had to take a turn helping push the big glass back and forth."

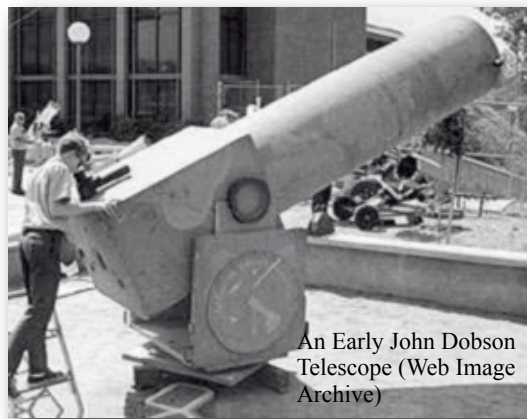
In the summer of 1986 John Dobson visited Springfield, Vermont, to attend Stellafane, a convention for amateur telescope makers, to deliver Saturday night's Twilight Talk. He was an honoured guest and Steve Dodson was there with him. Steve recounts, "The organizers had booked John into the historic Hartness House Inn located downtown. But, of course, John did not want to stay in the cushy accommodations off site. He stayed with my daughter, Natalie and myself, at our campsite in Miller's Field. He slept in our reclining lawn chair; thankfully with a blanket this time. After this Stellafane Convention John Dobson again returned to Sudbury with Natalie and me. One of Natalie's treasured memories of John Dobson is sitting at our piano and making music with him and singing for him."

And what became of the 29 inch mirror? "This visit also provided the opportunity for John to make a big pitch lap at Science

North, and initiate the polishing of the 29 inch mirror, something our little band of telescope-makers learned a great deal from." That f/6.5 mirror was later turned into a huge 500 lb Dobsonian telescope by Niagara Centre astronomer Denis Maheu.

John Dobson's legacy is much more than the telescope design that bears his name. His example, dedication, and energy has resulted in hundreds of thousands of people around the world experiencing their Universe for the first time. Listen to John in 1973, talking about his crusade .. "At least half of the population of the world should have the opportunity to view the Universe through a large telescope. There is a special beauty in astronomical knowledge. Everyone should see. Everyone should understand. What we do for ourselves is a waste .. what we do for others is beauty. Billions of eyes are waiting." Now, at 98 years old, John Dobson's energy and spirit has returned to the Universe he loved.

John Dobson's paper describing the Dobsonian mount was published in Celestial Observer (no longer publishing) in their Jul-Sep 1973 issue and is available on the BAS website. Look in USEFUL LINKS.



An Early John Dobson Telescope (Web Image Archive)

Steve Dodson continues telescope making as part of his Stargazer Steve business. The 6-inch f/5 truss tube dobsonian pictured below is one example of his typical innovative designs. He has kits for 4-inch, 6-inch, 8 and 10-inch designs at competitive prices. See his website at: <http://stargazer.isys.ca> for more information and current prices.



Modern motorized 30 inch Dobsonian design telescope owned by the Three Rivers Foundation in Australia (Cunningham Photo)



Steve Dodson (with a "d" not "b") built and travelled with a 22-inch Dobsonian design in the 1980's. He is shown below with son Patrick at Starfest (1984?). The mounting was an innovative original design that had motorized tracking and which was integrated into the trailer. Later the telescope ended up at Science North. Steve continues to manufacture smaller dobs (Stargazer Steve) one of which is shown below.

Image right: "Consolation Shot"

On Nov 15, one of the few clear nights this winter, Frank Williams had no chance to capture Comet ISON since there were obstructions towards his east. His comment: "Comet low in trees over owen sound glare....grrrrr" So he aimed his setup at something higher and sent in this shot. The familiar Horsehead Nebula (Barnard 33 silhouetted against the red hydrogen emission region known as IC 434) shows up quite nicely as does the Flame Nebula (NGC 2024), the yellowish nebula to left of Horsehead.

The brightest star is the leftmost star of Orion's Belt, Alnitak or zeta-Orionis. Image is a total of 54 minutes taken with a Canon T2i mounted at prime focus of Frank's 85 mm Televue refractor.



Image left: Veil Nebula

Paul Zelichowski sent in this amazing image taken with a telescope he recently completed. He writes: "My latest project (~3 yrs) was building a 12 inch hyperbolic newtonian astrograph using various components. Carbon fibre tube by Frank "Rocketman" Uroda, Van Slyke Instruments spider and mirror cell, 3.5 inch Starlight Feathertouch focuser w/ Robofocus and Hubble Optics f/ 4.27 mirror/corrector." For the image left he writes: "I had about 6 clear nights in Sept/Oct. after I got the scope together. I took a lot of short shots here and there but managed a few long exposures. Since, I've had the mirror recoated by Normand Fullum. The original coating was maybe 70% reflective. With a proper mirror coating (90%), now the pictures should be even better. This is just the beginning!"



HNA 12 f/4.27 Starbase 6 Image

The Veil Nebula NGC 6992

Paul Zelichowski 2013

You can see more of Paul's work at: <http://tiffanyweb.bmts.com/~ski/astro.html>. Well worth a visit!



Last June the Super Moon got a lot of attention (image left) but the FM last Dec 17 was at apogee and so was the smallest of 2013. Not a peep out of the media. Mini-moons (right) only get respect in SGN it appears. J. Hlynialuk images using TV101.

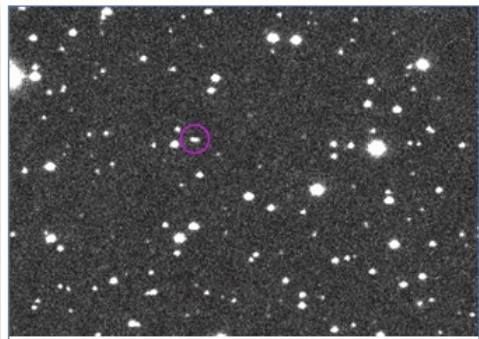


Aaron Top got this quick 90 second shot of Comet ISON Nov 15 on the way to work at 6:00 am. Canon 50D focal length 1000 mm ISO 800

Starting 2014 off with a Bang! Hello and Goodbye to Asteroid 2014 AA

By J.L. Galache on January 3, 2014
Minor Planet Center

It was just another typical night dedicated to searching for Near Earth Asteroids at the Mount Lemmon observatory. Well, it was the



A sequence of four images, taken roughly 11 minutes apart, reveals the movement of asteroid 2014 AA when it was discovered in northern Orion early on January 1st (Universal Time). The 19th-magnitude object struck Earth 25 hours later.
Catalina Sky Survey / NASA

first day (night) of the year, when most of us might have still been partying, but planetary protection knows naught about anthropocentric or heliocentric celebrations. Up in the 1.5m (60") telescope was observer Richard "The Impactor Whisperer" Kowalski, discoverer of the only other asteroid, 2008 TC3, to have been observed before entering Earth's atmosphere (back in September 2008). Shortly after 1:15am on January 1, he imaged an area of the sky where a small streak of light moved quickly against the background stars. Over the next hour or so he imaged that streak a total of 7 times and the positions of the asteroid were reported to us at the Minor Planet Center.

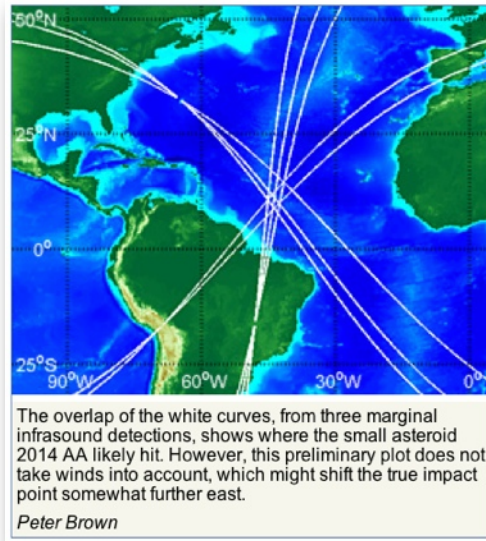
We announced this new asteroid some 31 hours after the first observation and designated it 2014 AA, the first asteroid discovered in 2014. It was an NEA. It had already hit us.

This is no way to start a new year!

Luckily it was a very small asteroid, 1-3m across, which almost surely burned up in the atmosphere, with the most that could reach the ground being small fragments. From the initial orbit it was unclear where the precise point of entry into the atmosphere had been. Bill Gray, an asteroid software developer, provided the following probable area of impact: As can be seen, it stretches about

one-third of the way across the globe. More precision has come from an analysis of infrasound data by Peter Brown (University of Western Ontario). Infrasound is extremely low-frequency acoustic energy (20 hertz or less) created, for example, during energetic explosions. A global network of detectors, maintained by the Comprehensive Nuclear-Test-Ban Treaty Organization, can pinpoint the location and energy of any powerful detonation — including airbursts from meteoric blasts.

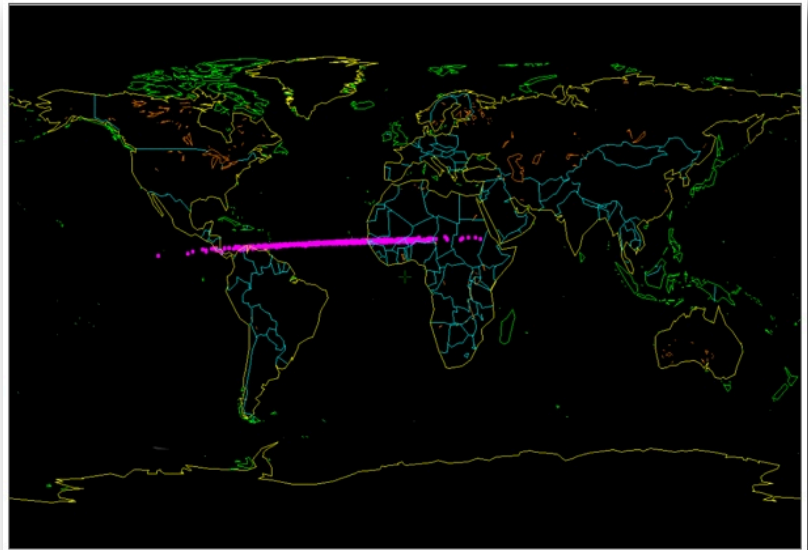
The overlap of the white curves, from three marginal infrasound detections, shows where the small asteroid 2014 AA likely hit.



The overlap of the white curves, from three marginal infrasound detections, shows where the small asteroid 2014 AA likely hit. However, this preliminary plot does not take winds into account, which might shift the true impact point somewhat further east.
Peter Brown

However, this preliminary plot does not take winds into account, which might shift the true impact point somewhat further east.

According to Brown, 2014 AA triggered very weak detections at three infrasound stations. His triangulation from those records, shown in the graphic above, indicates that the space rock slammed into the atmosphere near 40° W long, 12° N lat. That location, about 3,000 km east of Caracas, Venezuela, is far from any landmass.



Initial estimate of 2014 AA impact region by Bill Gray.

"The energy is very hard to estimate with much accuracy — the signals are all weak and buried in noise," Brown explains. And yet, he adds, we're lucky that the event happened just after local midnight, when winds are calmest. "Had this occurred in the middle of the day I doubt we would see any signals at all," he says.

Brown's rough guess is that the impact energy was equivalent to the explosive power of 500 to 1,000 tons of TNT — which, though powerful in human terms, implies the object was no bigger than a small car. "It was no Chelyabinsk," he says..

Given the location of the atmospheric disintegration of 2014 AA, it's likely it met a lonely death with no witnesses. But even if this had taken place over a populated area, the small size of this asteroid meant it would have put on nothing more than a light show, which would have paled in comparison to the Chelyabinsk meteor of February 15, 2013. The energy of that explosion was estimated at 500 kilotons of TNT, while 2014 AA provided a lowly 500 to 1,000 tons (500 to 1,000 times less) according to Peter Brown's estimates.

Let's not forget that asteroids the size of a car enter the Earth's atmosphere a few times a year — what's special about 2014 AA is that we discovered it before it got here. Will we have to wait another 5 years to do it again?

Read the entire Minor Planet Centre report here:

<http://minorplanetcenter.net/blog/>

NASA's Swift Catches X-ray Action at Milky Way's Center

January 8, 2014 NASA Press Release 14-007

Recent observations by NASA's Swift spacecraft have provided scientists a unique glimpse into the activity at the center of our galaxy and led to the discovery of a rare celestial entity that may help them test predictions of Albert Einstein's theory of general relativity.

This week, at the annual meeting of the American Astronomical Society in National Harbor, Md., scientists presented their research into images captured by Swift, explaining how these images will help decipher the physical nature of X-ray flares and enabled their discovery of a rare subclass of neutron star.

Swift's seven-year campaign to monitor the center of the Milky Way has doubled the number of images available to scientists of bright X-ray flares occurring at the galaxy's central black hole, dubbed Sagittarius A* (Sgr A*).

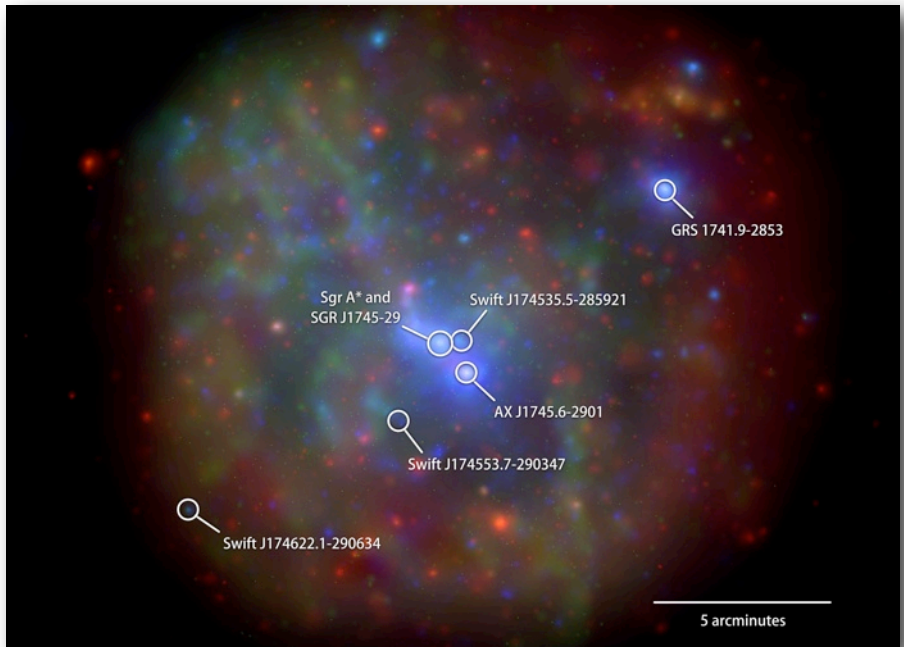
Sgr A* sits in the center of the Milky Way's innermost region, 26,000 light-years away in the direction of the constellation Sagittarius. Its mass is at least 4 million times that of the sun. Despite its considerable size, it is not nearly as bright as it could be if it was more active, according to one expert.

"Given its size, this supermassive black hole is about a billion times fainter than it could be," said Nathalie Degenaar, principal investigator on the Swift galactic center campaign and an astronomer at the University of Michigan in Ann Arbor. "Though it's sedate now, it was quite active in the past and still regularly produces brief X-ray flares today."

To better understand the black hole's behavior over time, the Swift team began making regular observations of the Milky Way's center in February 2006. Every few days, the Swift spacecraft turns toward the innermost region of the galaxy and takes a 17-minute-long snapshot with its X-ray Telescope (XRT).

To date, Swift's XRT has detected six bright flares during which the black hole's X-ray emission was as much as 150 times brighter for a couple of hours. These new detections enabled the team to estimate that similar flares occur every five to 10 days. Scientists will look at differences between the outbursts to decipher their physical nature.

The Swift XRT team expects 2014 to be a banner year for the campaign. A cold gas cloud named G2, about three times the mass of Earth, will pass near Sgr A* and already is being affected by tides from the black hole's powerful gravitational field. Astronomers expect G2 will swing so close to the black hole during the second quarter of the year that it will heat up to the point where it produces X-rays.



This X-ray image of the galactic center merges Swift XRT observations through 2013. Sgr A* is at center. Low-energy X-rays (300 to 1,500 electron volts) are shown in red, medium-energy (1,500 to 3,000 eV) in green, and high-energy (3,000 to 10,000 eV) in blue. The total exposure time is 12.6 days. **Image Credit: NASA/Swift/N. Degenaar (Univ. of Michigan)**

If some of the cloud's gas actually reaches Sgr A*, astronomers may witness a significant increase in activity from the black hole. The event will unfold over the next few years, giving scientists a front-row seat to study the phenomena.

"Astronomers around the world are eagerly awaiting the first sign that this interaction has begun," said Jamie Kennea, a team member at Pennsylvania State University in University Park, Pa. "With the invaluable help of Swift, our monitoring program may well provide that indicator."

Scientists saw what they thought was a sign in April, when Swift detected a powerful high-energy burst and a dramatic rise in the X-ray brightness of the Sgr A* region. They were excited to discover the activity came from separate source very near the black hole: a rare subclass of neutron star.

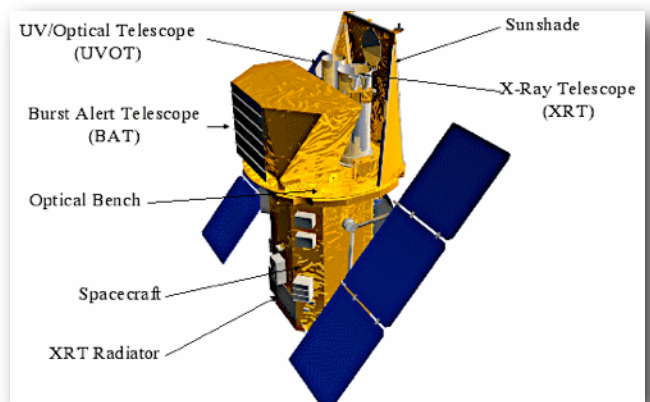
A neutron star is the crushed core of a star destroyed by a supernova explosion, packing the equivalent mass of a half-million Earths into a sphere no wider than Washington. The neutron star, named SGR J1745-29, is a magnetar, meaning its magnetic field is thousands of times stronger than an average neutron star. Only 26 magnetars have been identified to date.

The discovery of SGR J1745-29 may aid scientists in their exploration of important properties of the Sgr A* black hole. As it spins, the magnetar emits regular X-ray and radio pulses. As it orbits Sgr A*, astronomers could detect subtle changes in the pulse timing

because of the black hole's gravitational field, a prediction of Einstein's theory of general relativity.

"This long-term program has reaped many scientific rewards, and due to a combination of the spacecraft's flexibility and the sensitivity of its XRT, Swift is the only satellite that can carry out such a campaign," said Neil Gehrels, the mission's principal investigator at NASA's Goddard Space Flight Center in Greenbelt, Md. Goddard manages Swift, which was launched in November 2004. Goddard operates the spacecraft in collaboration with Pennsylvania State University, the Los Alamos National Laboratory in New Mexico and Orbital Sciences Corp. in Dulles, Va. International collaborators are located in the United Kingdom and Italy. The mission includes contributions from Germany and Japan.

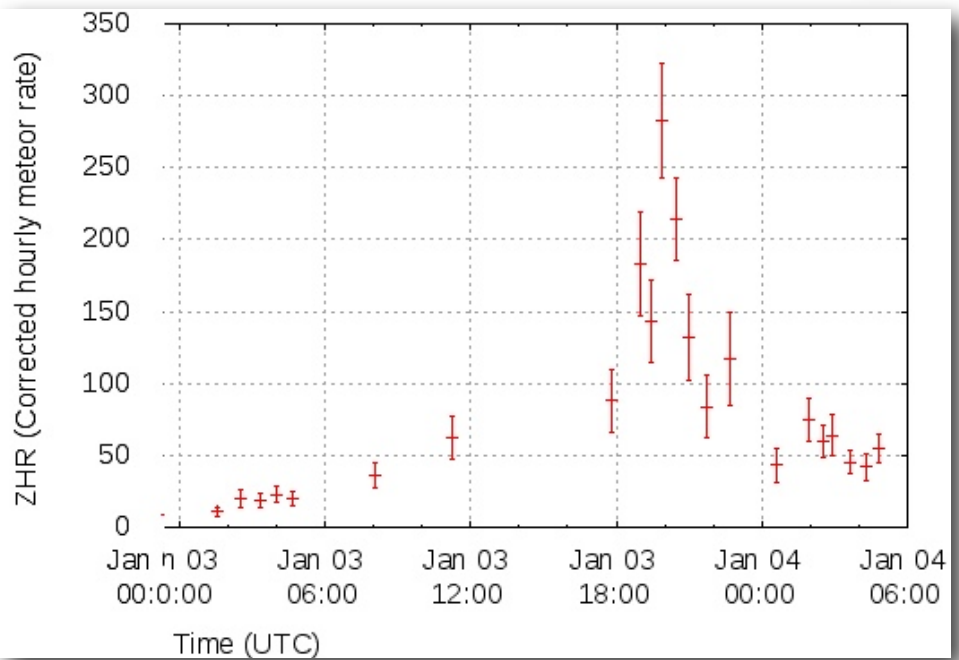
More about Swift here: <http://www.nasa.gov/swift>



Local Meteor Watch Clouded Out

The Quadrantid meteor shower came and went under overcast and windy skies in Bruce-Grey. This instance of this shower was not ideal in any case for North America although see next paragraph for one exception. The graph right shows the observations of 25 observers in 13 countries, mostly in Europe and Asia. Analysis shows a **ZHR of 283 per hour**. (Zenithal Hourly Rate, the number of meteors an observer would see under a very dark sky with the radiant of the shower in zenith). This is based on a total of 467 Quadrantids seen.

The lone North American observer was a fellow in S. California who logged 22 Quadrantid meteors. It is important to note that while the temperature at the Fox Observatory at 8 pm was -14C with a wind chill of -24C, it was a balmy 8C in CA with a humidity of 44%. I have been in the area on holiday and it IS as nice as it SOUNDS!



Hubble Sees a Stellar "Sneezing Fit"



Look at the bright star in the middle of this image. It appears as if it just sneezed. This sight will only last for a few thousand years — a blink of an eye in the young star's life.

If you could carry on watching for a few years you would realize it's not just one sneeze, but a sneezing fit. This young star is firing off rapid releases of super-hot, super-fast gas, like multiple sneezes, before it finally exhausts itself. These bursts of gas have shaped the turbulent surroundings, creating structures known as Herbig-Haro objects.

These objects are formed from the star's energetic "sneezes." Launched due to magnetic fields around the forming star, these energetic releases can contain as much mass as our home planet, and cannon into nearby clouds of gas at hundreds of kilometers/miles per second. Shock waves form, such as the U-shape below

this star. Unlike most other astronomical phenomena, as the waves crash outwards, they can be seen moving across human timescales of years. Soon, this star will stop sneezing, and mature to become a star like our sun.

This region is actually home to several interesting objects. The star at the center of the frame is a variable star named V633 Cassiopeiae, with Herbig-Haro objects HH 161 and HH 164 forming parts of the horseshoe-shaped loop emanating from it. The slightly shrouded star just to the left is known as V376 Cassiopeiae, another variable star that has succumbed to its neighbor's infectious sneezing fits; this star is also sneezing, creating yet another Herbig-Haro object — HH 162. Both stars are very young and are still surrounded by dusty material left over from their formation, which spans the gap between the two.

Cassiopeia the Queen

α-Cassiopeiae - Shedar

β-Cas - Caph

γ-Cas - Tsih

δ-Cas - Ruchbah

Cassiopeia is an easily recognized constellation; its five 2nd and 3rd magnitude stars form a widespread W or M, depending on its position in the sky. It is the same distance from the pole as Ursa Major. A line connecting α-Andromedae, γ-Pegasi and β-Cassiopeiae marks the equinoctial colure; where this line, extended to the south, crosses the equator (and the ecliptic) marks the vernal equinox, the point in the heavens from which all right ascension coordinates are measured. Cassiopeia is rich in star fields and clusters; scan carefully with fieldglasses, especially around the area of γ-Cassiopeiae.

Double Stars

Star	Mag.	Sep'n (s)	Location	Remarks
α	2.5-9.0	64	003856	Yellow-Blue
η	3.5-7.3	11	004758	Yellow-Purple; easy for small scope
ι	4.7-7.0-8.2	2-7	022567	Yellow-Blue-Blue; very fine; triple
σ	5.4-7.5	3	235755	Green-Blue; fine field
φ	4.5-8.9	25	012268	
Σ163	6.2-8.2-9.7	35-115	014864	Gold-Blue
Σ191	6.2-8.5	5	015974	

Messier Objects

Mag	Location	Remarks
M 52	7.3 232261	Open Cluster. Very fine.
M103	7.4 013060	Open Cluster

Objects of Interest in Cassiopeia

- NGC 103** - Open Cluster. Designation 002161.
- NGC 663** - A beautiful open cluster, many stars. Location 014161.
- NGC 7789** - Beautiful open cl; large cloud small stars. Loc'n 235456.
- γ-Cassiopeiae** - Irregular variable, magnitude range 1.6-2.3.
- R Cassiopeiae** - Long per. (431 d) var., max. mag. 7.0. Loc'n 235351.
- T Cassiopeiae** - Long per. (445 d) var., max. mag. 7.8. Loc'n 002155.
- V Cassiopeiae** - Long per. (228 d) var., max. mag. 7.9. Loc'n 231059.

NGC 457, the ET Cluster (image below) is located at the position of the star marked φ, just below Ruchbah (δ-Cas). The star φ is in the heart of the cluster and makes "ET" easy to locate. This cluster always gets a chuckle from first time observers because it actually does look like a stick figure version of ET. I have never yet met a child or an adult who cannot see the resemblance. It is also called the Owl Cluster -see the full list below!

There are a number of other NGC clusters nearby, including M103, the rest of ET's "family"? It turns out that φ-Cas is a nice double -a 5th and 7th magnitude star pair coloured yellow and blue. They are easily separated in a telescope and form ET's eyes.



Image by John H.

NGC 457 aka ET Cluster, Owl Cluster, Caldwell 13, Skiing Cluster, and the Kachina Doll Cluster!

Cepheus the King

α-Cephei - Alderamin

β-Cephei - Alfirk

γ-Cephei - Er Rai

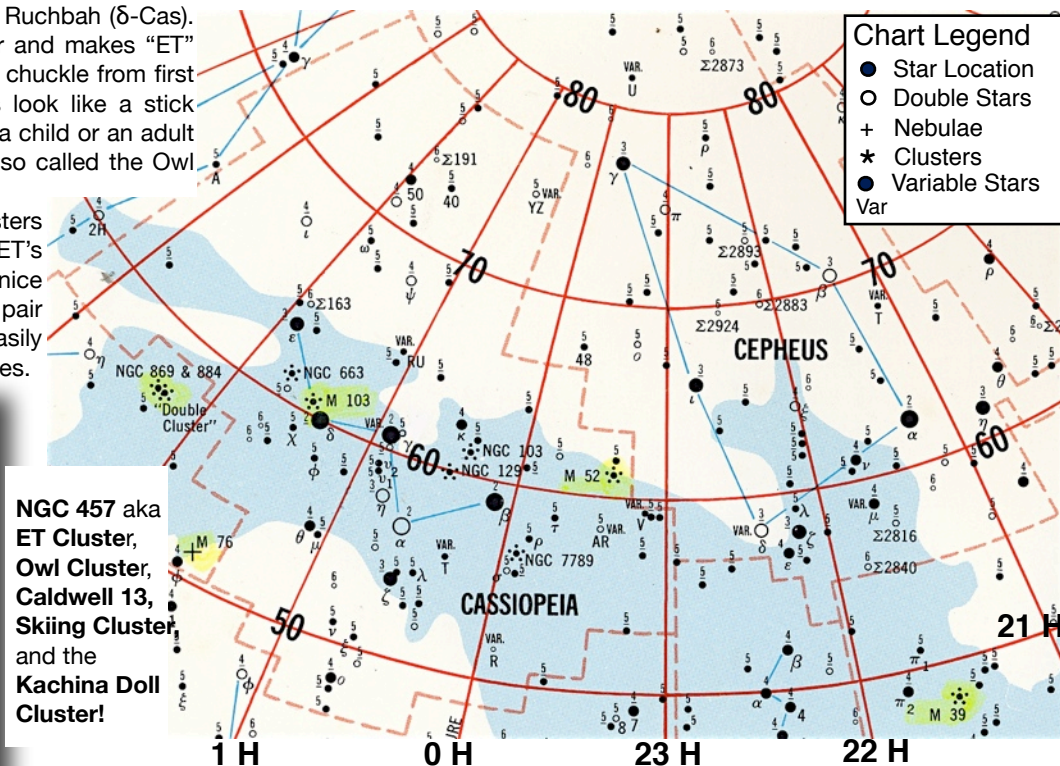
Cepheus is a circumpolar constellation; its five rather faint stars form a rough peak-roofed house-shaped figure, like a small child's drawing. It and Ursa Major are in exactly opposite directions from the Pole Star. δ-Cephei is the prototype of the so-called "Cepheid Variable" type of star; it derives its name from the constellation. A Cepheid variable is a short period variable having a definite relationship between its apparent magnitude and its period of variation. This "period-luminosity" relationship has been invaluable in determining the distance of faraway objects in the universe. δ-Cephei is also a beautiful field glass double. μ-Cephei is the "Garnet Star": compare its color with α-Cephei, a white star.

Double Stars

Star	Mag.	Sep'n (s)	Location	Remarks
β	3.3-8.0	14	212870	White-Blue.
δ	3.7 to 4.4-7.5	41	222858	Yellow-Blue; beautiful.
κ	4.4-8.0	7	201377	White-Blue.
ο	5.2-7.8	3	231768	Yellow-Blue.
ξ	4.6-6.5	7	220264	Both Bluish White.
Σ2816	6.0-7.9-8.0	12-20	213658	Triple.
Σ2840	6.0-7.0	20	215056	Pale Grn-Pale Blue; beautiful
Σ2873	6.2-7.0	14	220083	
Σ2883	6.2-8.2	15	221070	White-Blue.
Σ2893	5.5-7.6	29	221273	Yellow-White.
Σ2924	6.8-7.3	0.7	223270	

Other Objects of Interest in Cepheus (Cep)

- μ-Cephei** - Irregular variable, magnitude range 3.6-5.1. A beautiful deep red in color; view with low power. Loc'n 214159.
- T Cephei** - Long period (390 days) variable, maximum magnitude 6.0. Location 210868
- U Cephei** - Eclipsing variable, period 2.49295 days, magnitude range 6.7-9.8. Location 005882. Sweep with low power between Cepheus and Polaris.



Time in Eastern Standard Time is given after the dates

- Feb 01** 02:07 Mercury 4.1°S of Moon
- Feb 02** 15:27 Mars 4.4°N of Spica
- Feb 03** 19:00 Mercury at Perihelion
- Feb 06** 14:22 **FIRST QUARTER MOON**
- Feb 08** 09:41 Aldebaran 2.3°S of Moon
- Feb 11** 01:10 Jupiter 5.0°N of Moon
- Feb 12** 00:09 Moon at Apogee: 406 232 km
- Feb 14** 18:53 **FULL MOON** ♥ Valentine's Day
- Feb 15** 05:40 Regulus 5.1°N of Moon
15:00 Mercury at Inferior Conjunction (near Sun)
- Feb 19** 09:54 Spica 1.6°S of Moon
18:59 Mars 3.1°N of Moon
- Feb 21** 17:39 Saturn 0.3°N of Moon: Occultation vis. Indian O.
- Feb 22** 12:15 **LAST QUARTER MOON**
- Feb 23** 12:00 Neptune in Conjunction with Sun
- Feb 26** 00:23 Venus 0.4°S of Moon: Occultation, vis. cen. Africa.
- Feb 27** 14:52 Moon at Perigee: 360439 km
16:24 Mercury 2.9°S of Moon

Note: there is no New Moon in Feb since we had two in January.

BAS Events

BAS does not meet in January or February due to the generally poor winter driving conditions. Our next regular meeting takes place at the Grey Roots Museum at the usual time on March 5, 2014.

However, impromptu viewings still go on at the Fox Observatory as weather permits. Regular members receive notifications of these (usually fairly short notice) as they occur. If you are not a regular member and are not on the notification email list please send a short note to John, Aaron or Brett at one of the emails listed in the BAS Executive box on pg 2.

Special Events

Planetary Occultations -not much in 2014

Saturn has been undergoing a series of occultations by the Moon since December 2013. Unfortunately, the geographical locations where these can be observed are (like solar eclipse) restricted to specific areas of the Earth's surface. Not quite as narrow as solar eclipse tracks, Saturn events are more like partial solar eclipses.

In 2014 the 4th Saturn occultation of 13 that started last year will occur on Feb 21. Unfortunately, as with almost ALL of them, they are not visible in North America. The Feb 21 passage of the Moon in front of Saturn can be seen in Madagascar, most of Australia and New Zealand. A second is visible in the same regions in May.

Only two Saturn occultations occur over North America: the first on Aug 31 and again on Oct 25, but sadly both are daytime events with a bright quarter moons, -the observation will be difficult if not impossible. Still it may be an interesting challenge observation.

Venus also is occulted once this year (Feb 26) and again, this event is not visible from North America. We just can't get a break.

The story is the same for **Mars** (July 6), an occultation visible in Hawaii and South America but nowhere near Bruce-Grey.

Jupiter is missed by the Moon in 2014, but not so **Uranus**. Uranus is occulted six times! (Aug 14, Sep 10, Oct 8, Nov 4, Dec 2 and Dec 29) but again, except for one, they are only visible in inaccessible regions -this time in the Arctic. The Sep 10 event is visible in E. Can. and will occur during dark hours but, on the down side, the Moon is FULL and the planet is occulted just before moonrise in the Owen Sound area! Both Dec events, fall across W. and N. Canada, respectively, and happen during dark hours but cannot be seen from Bruce-Grey. The other gas giant planet, **Neptune** is missed by the Moon in 2014.

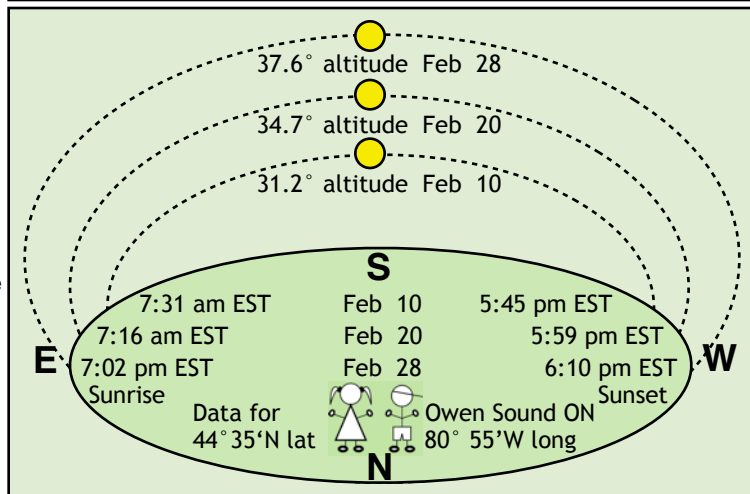
Lastly, two asteroids (**Ceres and Vesta**) get occulted by the Moon on the same night as Saturn Sep 28, but (same old story) none of the three events is visible from Canada.

Planets

MERCURY, heads back towards the Sun and by mid-month is in conjunction and too close to be seen. It is better at the end of Feb but still

only 10° high at sunrise. **VENUS**, ramps up again in brightness to -4.9 by mid-month and is now a prominent Morning Star. A thin last crescent Moon is near Venus on Feb 26. On the 27th the crescent appears near Mercury. **MARS** (mag. 0.0) is now rising before midnight (before 10 pm by month-end) and is visible until dawn in Virgo. **JUPITER**, (-2.6) is 45° high by sunset in Feb and sets in the wee hours by month end (3 am). Jupiter viewing is good all month if you can stand the cold. **SATURN**, (mag 0.5) rises at 2 am at the start of February and by midnight at the end. Ring tilt is very nice, about 22.5 degrees in February and March as well. Both **URANUS**, (5.7) and **NEPTUNE**, (7.8) are above the horizon at sunset but by month end Neptune sets by the end of twilight and Uranus is too close to the Sun to observe. Both **asteroid, Vesta** (6.1) and **dwarf planet, Ceres** (7.0) are in the same part of the dawn sky as Mars. Charts are available on the BAS website. **PLUTO** (mag. 14) is in twilight at dawn presently and near Venus this month, but the viewing time is short before the Sun rises. Pluto finder charts for 2014 are now found on the BAS website.

The diagram below gives the sunrise/sunset times and the Sun's altitude on three dates this month. The Sun continues slowly gaining elevation during February heading for Equinox in March.



Feb 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		By permission Univ. of Texas McDonald Obs.				1
2	3	4	5	6 FQ	7	8
9	10	11	12	13	14 FM	15
16	17	18	19	20	21	22 LQ
23	24	25	26	27	28	NM

BAS Member Loaner Scopes

Solar H-alpha scope now out on loan.

Our Lunt solar scope can be borrowed by a BAS member and there is a waiting list! Contact Aaron to get your name on it. We now have a suitable mount for it as well. A short training session will be provided on pickup.

TWO 12-inch Dobbs available.

Both 12-inch loaner telescopes are available for the winter. Our two 8-inch dobsonians are presently out on loan but there are others available. Contact Brett T. or Aaron T. to check on availability. Scopes come in and out periodically so keep checking with Brett or Aaron if you are interested in a loaner.



**SGN
Classified
Ads Section**

(Now also on our website)

FOR SALE: Televue Pronto

2 element E.D. Refractor, 2.7" / 70mm diameter. f.l. 480mm, f/6.8. with 1-1/4" Star Diagonal, with 45 degree Prism diagonal (for terrestrial viewing), with TeleVue Red dot finder, complete with TeleVue Soft Case. Asking \$ 700.-- Firm Anton VanDijk 519 376-9912 ravand@rogers.com



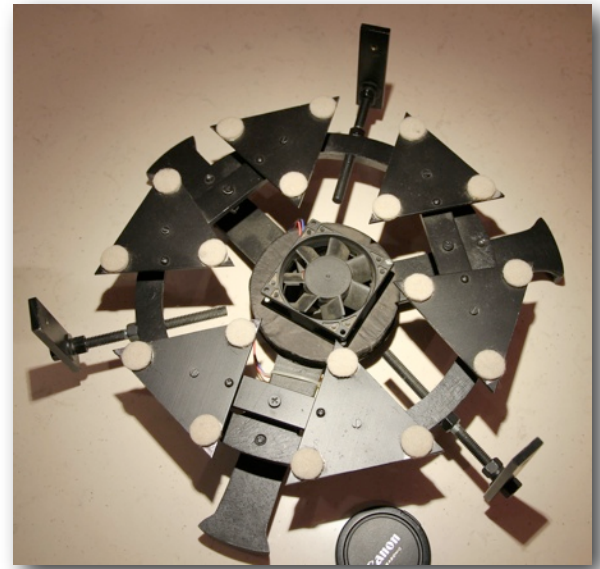
FOR SALE: 16-inch mirror cell

Aluminum 18-point suspension mirror cell for 16 inch mirror (will accommodate 14 in). Comes with central cooling 12 V DC computer fan. Additional cooling fans available \$5 ea. Asking \$100 for cell. Contact John H. 519 371-0670 stargazer@wightman.ca

FREE: Mirror-grinding machine to a good BAS home



One of our former members has donated a 90% finished mirror-grinding machine to BAS and we have decided to put it out there for anyone in the club who wants to give it a good home. Note that it is not finished but plans are available from Mirror-o-Matic.com and we have a copy of the file on computer. This unit was designed to do 12 inch mirrors but will handle smaller (8 & 10 inch) mirrors with some minor adjustments. BAS also has pretty much complete kits of abrasives and maybe even a mirror blank or two that we will include with the deal. Comes with documentation and a copy of Edmund Scientific Co. Mirror Grinding booklet. Note this outfit is free to current BAS members but if you are not a member, then you can purchase the unit for \$120 and we will throw in a year's membership. Contact John (stargazer@wightman.ca) if you are interested.



The Cartoon Corner

This astronomy cartoon is an original drawing by long-time member of the LCAS (Lake County Astronomical Society) and are used with his kind permission. LCAS was founded in Lake County, Illinois in 1982 and they are still going strong.

[Rich would have had no trouble if he had used the mirror-grinding machine above left. -ed]

All of us wondered what had happened to Rich and the schiefspiegler optics he had supposedly been grinding over the past several years...

