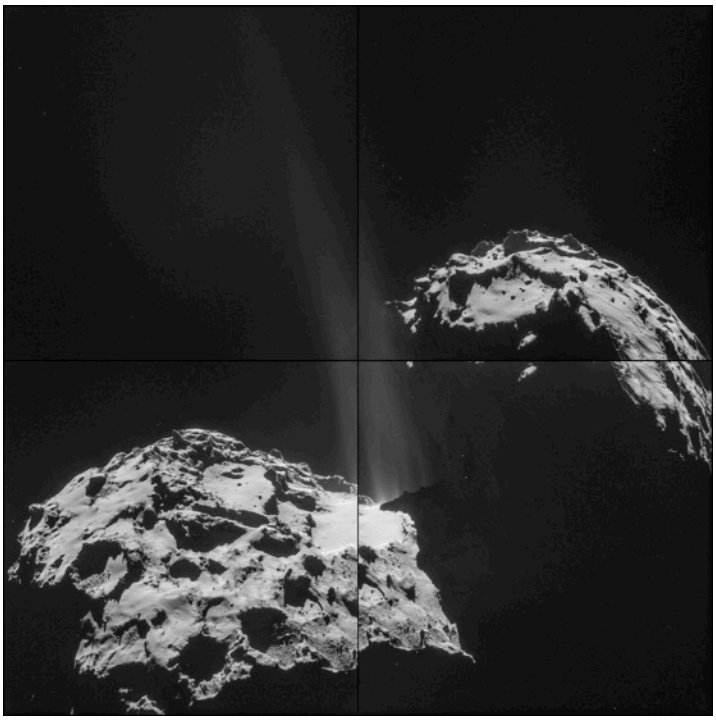
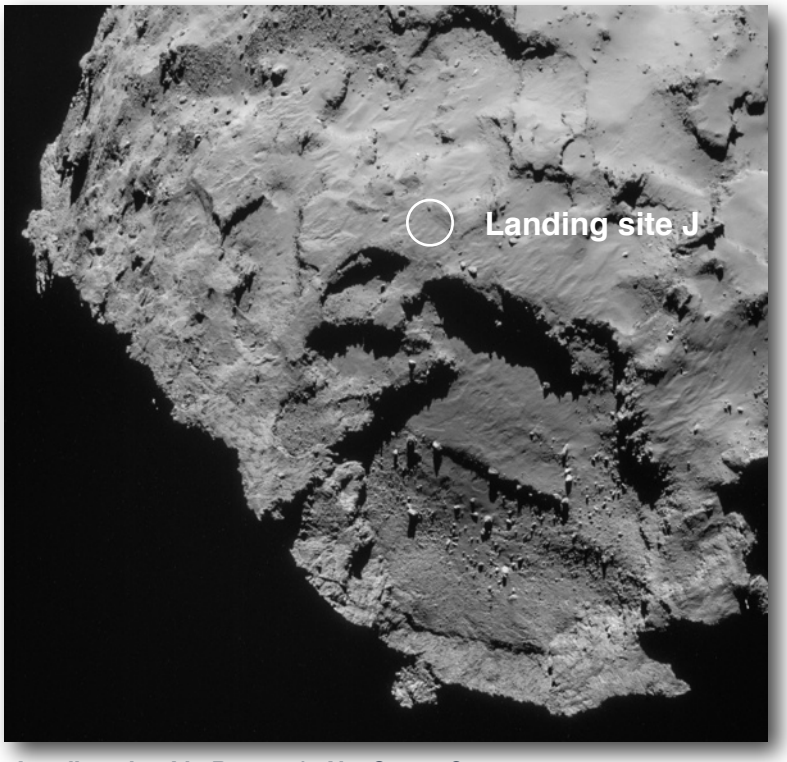
Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 8 No.11 Nov 2014

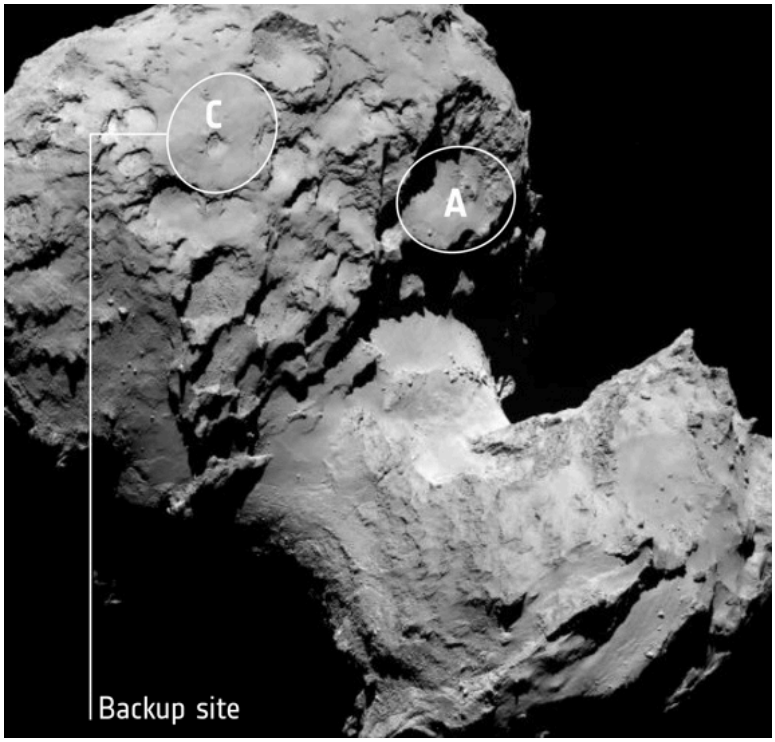
Nov 2014 Contents



Four-image montage comprising images taken by Rosetta's navigation camera on 26 September from a distance of 26.3 km from Comet 67P/Churyumov-Gerasimenko. The comet nucleus is about 4 km across. The image shows the spectacular region of activity at the 'neck' of 67P/C-G. This is the product of ices sublimating and gases escaping from inside the comet, carrying streams of dust out into space.
Credit: ESA/Rosetta/NAVCAM



Landing site J in Rosetta's NavCam *– Sep 21, 2014*
Rosetta's navigation camera (NAVCAM) took this image of Comet 67P/Churyumov-Gerasimenko on 21 September, from a distance of 27.8 km from the comet centre. The image covers an area of about 2 x 1.9 km and focuses on the smaller of the two comet lobes. The primary landing site J is 'above' the distinctive [dark-walled] depression in [the centre of] this view. ***Image Credit:*** *ESA/Rosetta team*



Rosetta Lander's Backup Landing Site: The backup landing site C was chosen over other candidate sites because of a higher illumination profile and fewer boulders. Site A, seen here was dismissed as it did not satisfy a number of the key criteria. The five candidate sites (A, B, C, I and J) were assigned letters based on an original pre-selection of 10 possible sites identified A through J. The lettering scheme does not signify any ranking. The regions are marked on OSIRIS narrow-angle camera images taken on August 16, 2014, from a distance of about 100 km. The comet nucleus is about 4 km across.
Credit: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

BAS Executive 2013-2015

President:	Aaron Top	aarontop@hotmail.com
Vice-President:	John Hlynialuk	stargazer@wightman.ca
Secretary:	Lorraine Rodgers	lrodgers@bmts.com
Treasurer:	Cheryl Dawson	cheryl.dawson@bell.net
Past-President:	Brett Tatton	bretttatton@gmail.com
Membership:	David Skelton	dskel@golden.net
Public Outreach:	TBA	

Bluewater OEC Nature Inspired Since 1972-1973 | The Bluewater Education Foundation | GREY ROOTS MUSEUM & ARCHIVES

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 Editor:

Site Manager at BOEC Deb Diebel was honoured this fall by COEO (Council of Outdoor Educators) who presented her with the COEO President's Award "in recogntion of her outstanding contribution to the development of COEO and to Outdoor Education in Ontario." In the words of Clive Card, former principal of the BOEC:

"*This is a huge honour, as there are so many who support and promote the values and benefits of outdoor education at so many levels. The last person from our District to receive this award was Clarke Birchard in 1983, so Deb is in very prestigious company.*

It's a recognition she richly deserves as she continues to show exemplary leadership here at home, and in the province at large."

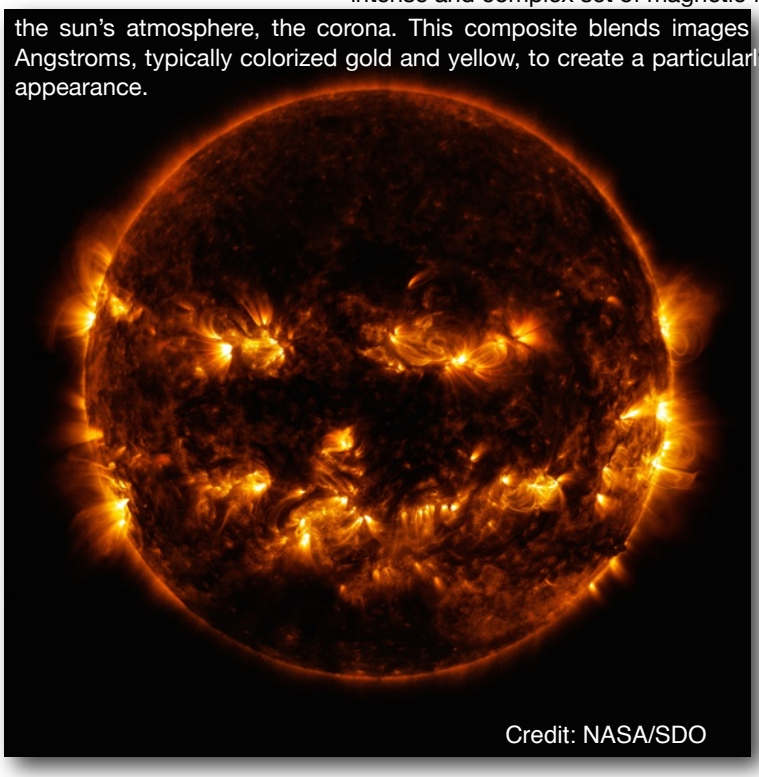
Deb, as most of you know, was the site manager during the partnership with BAS and the Bluewater ED Foundation that made the ES Fox Observatory happen. She worked hard on many aspects including the Dark Sky Preserve designation for the BOEC.

On a personal note, Deb is a joy to work with, always enthusiastic and working hard to make the BOEC the ward-winning facility that it is. While the BOEC is often described by Bluewater DSB folks as a "jewel", seems to me they have another "gem" out there! Congratulations, Deb, on a well-deserved award!

L-R Kyle Clarke, COEO Past President, Deb Diebel and Allyson Brown COEO President.

Sun says: "BOO!"

Active regions on the sun combined to look something like a jack-o-lantern's face on Oct. 8, 2014. The active regions emit more light and energy — markers of an intense and complex set of magnetic fields hovering in the sun's atmosphere, the corona. This composite blends images at 171 and 193 Angstroms, typically colorized gold and yellow, to create a particularly Halloween appearance.



BAS Events in Nov

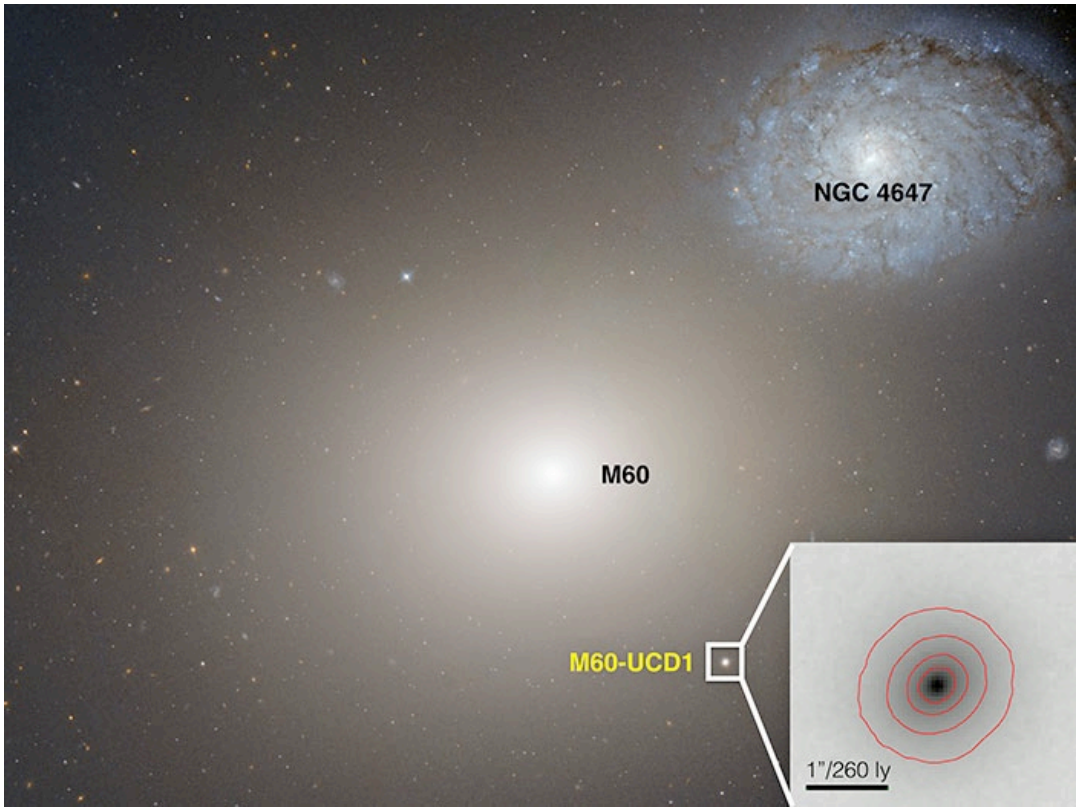
Nov 5 Wed	**BAS meeting** Grey Roots Museum 7 pm Member's Night and Gadget Night
Nov 22 Sat NM	**BAS viewing at** ES Fox Observatory. Members and guests welcome.

Astronomical Events in Nov

Nov 2	**DST ends 2:00 am Turn clocks back 1 h.**
Nov 6 Thu FM	Night of the **Full Moon** "Frosty Moon"
Nov 12 Tue	**Philae lands on Comet 67/P C-G**
Nov 17 Mon NM-4	**Leonid meteors** 20/h at peak 7 pm, Moon 20%,waning, not a major shower this year
Nov 20 Thu NM-2	**Asteroid Juno (magnitude 9.1) occults 7.4 magnitude star SAO 117176**. Drop in mag. will be 2.3 magnitudes a noticeable change. Ground track is north of Huntsville, ON.

Sep 18, 2014 PhysicsWorld.com

A supermassive black hole (SMBH) has been found lurking in an unexpected location – at the heart of an ultra-compact dwarf galaxy – according to new observations made by an international team of astronomers. Although SMBHs are thought to reside at the centre of most large galaxies including our own Milky Way, this is the smallest galaxy known to host a black hole. The team's findings suggest that many other such ultra-compact dwarf galaxies may house black holes, meaning that there may be many more SMBHs in our galactic neighbourhood than previously thought.



This Hubble Space telescope image shows the gargantuan galaxy M60 in the centre, and the ultra-compact dwarf galaxy M60-UCD1 below it and to the right, and also enlarged as an inset. M60's gravity also is pulling galaxy NGC4647, upper right, and the two eventually will collide. (Courtesy: NASA/Space Telescope Science Institute/European Space Agency)

SMBHs are the largest type of black hole, and can have masses that are 100 000 –10 billion times that of the Sun. On the other hand, ultra-compact dwarf galaxies are small galaxies that are also among the densest star systems in the universe. They are less than a few hundred light-years across as compared with our Milky Way's 100,000 light-year diameter. However, astronomers have been puzzled by the very large estimated masses of these small galaxies, which seemed to suggest the unexpected presence of SMBHs.

This theory now seems to be confirmed by observations, made by Anil Seth from the University of Utah in the US and colleagues, of a supermassive black hole inside the brightest-known ultra-compact dwarf galaxy M60-UCD1.

"We've known for some time that many ultra-compact dwarf galaxies are a bit overweight. They just appear to be too heavy for the luminosity of their stars," says team member Steffen Mieske from the European Southern Observatory in Chile. "We had already published a study about the presence of supermassive black holes, but the theory is now supported by evidence". The team's observations have also highlighted that there may be many black holes that have gone unnoticed to date. Indeed, there may be as many as double the known number of black holes in what astronomers refer to as our "local universe".

Lying about 50 million light-years away from Earth, M60-UCD1 is a tiny galaxy with a diameter of 300 light-years across. However, despite its modest size, it contains some 140 million stars. While this is a characteristic of an ultra-compact dwarf galaxy, M60-UCD1 happens to be the densest ever seen. The black hole itself has a mass of nearly 21 million Suns, which accounts for almost 15% of M60-UCD1's total mass.

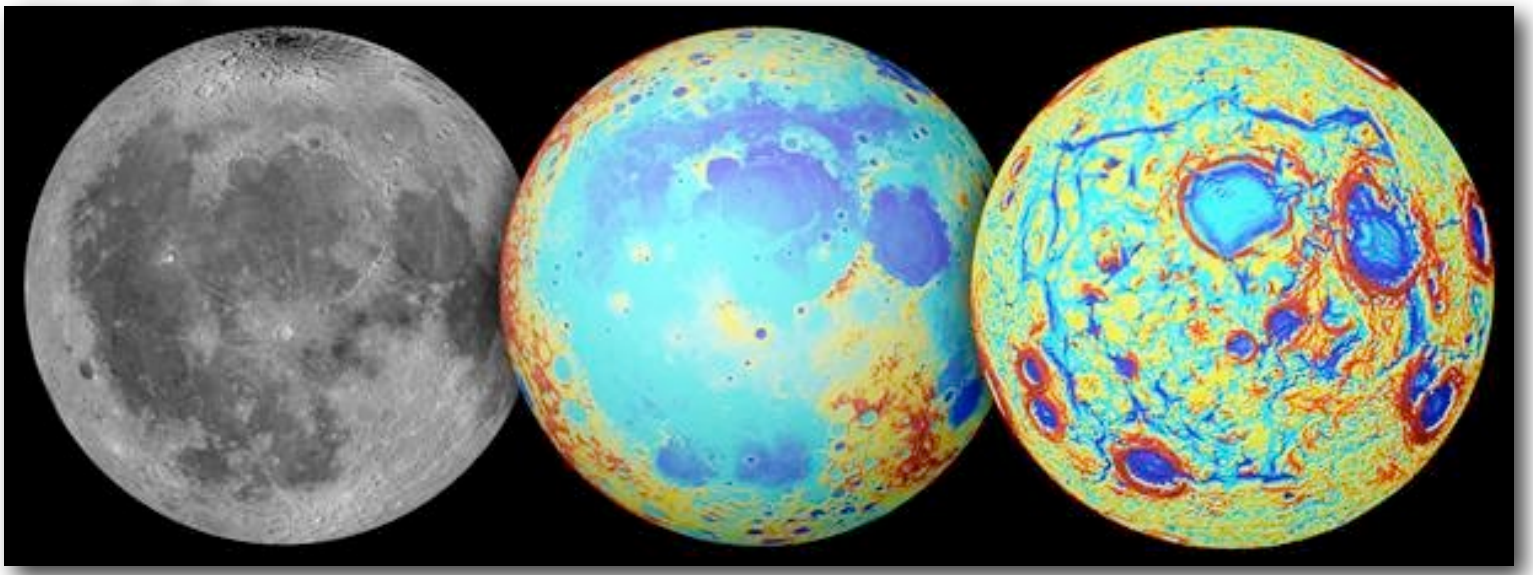
"That is pretty amazing, given that the Milky Way is 500 times larger and more than 1000 times heavier than M60-UCD1," says Seth. "In fact, even though the black hole at the centre of our Milky Way galaxy has the mass of four million Suns, it is still less than 0.01% of the Milky Way's total mass, which makes you realize how significant M60-UCD1's black hole really is."

The team made its discoveries using both the NASA/ESA Hubble Space Telescope and the Gemini North 8-metre optical and infrared telescope in Hawaii. The team's findings also have an impact on current theories of how ultra-compact dwarf galaxies themselves are formed. "This finding suggests that dwarf galaxies may actually be the stripped remnants of larger galaxies that were torn apart during collisions with other galaxies, rather than small islands of stars born in isolation," explains Seth. "We don't know of any other way you could make a black hole so big in an object this small."

Seth and colleagues suggest that M60-UCD1 was, at one time, a much larger galaxy made up of 10 billion stars and hosted an appropriately sized SMBH. This ancient galaxy may have then passed too close to the centre of its much larger neighbouring galaxy, M60, thereby losing its outer part to its larger companion, leaving behind the small, compact galaxy we observe today. (M60 is also pulling in another galaxy, named NGC4647, which is 25 times less massive than it.)

The team says that, in the future, M60-UDC1 may merge with M60 – which harbours its own humongous black hole that is 4.5 billion solar masses and 1000 times bigger than our galaxy's black hole – to form a single galaxy. A merger between the two galaxies would also cause the black holes to merge, creating an even more monstrous black hole.
The research was published in Nature.

Author: Tushna Commissariat is a reporter for physicsworld.com



Earth's moon as observed in visible light (left), topography (center, where red is high and blue is low), and the GRAIL gravity gradients (right). The Procellarum region is a broad region of low topography covered in dark mare basalt. The gravity gradients reveal a giant rectangular pattern of structures surrounding the region.
Image Credit: NASA/GSFC/JPL/Colorado School of Mines/MIT

Ocean of Storms Not Ancient Impact Basin

Using data from NASA's Gravity Recovery and Interior Laboratory (GRAIL), mission scientists have solved a lunar mystery almost as old as the moon itself. Early theories suggested the craggy outline of a region of the moon's surface known as Oceanus Procellarum, or the Ocean of Storms, was caused by an asteroid impact. If this theory had been correct, the basin it formed would be the largest asteroid impact basin on the moon. However, mission scientists studying GRAIL data believe they have found evidence the craggy outline of this rectangular region -- roughly 1,600 miles (2,600 kilometers) across -- is actually the result of the formation of ancient rift valleys.

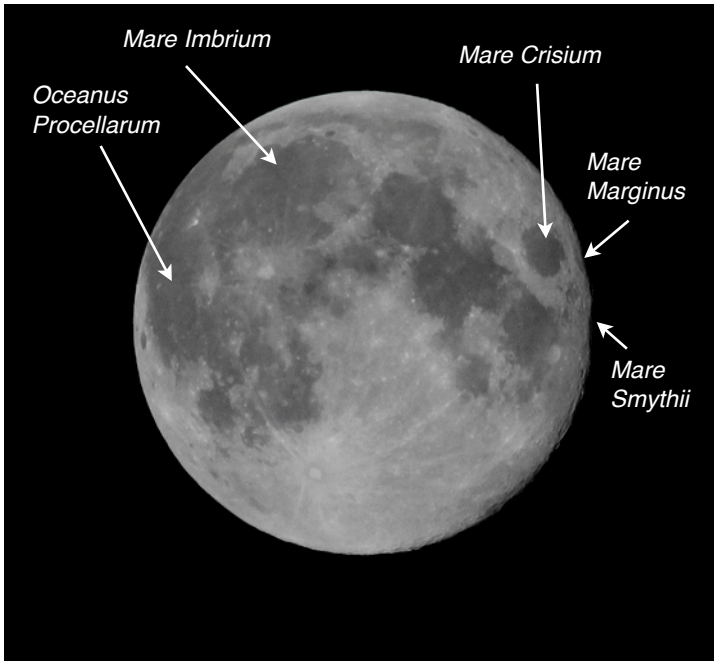
"The nearside of the moon has been studied for centuries, and yet continues to offer up surprises for scientists with the right tools," said Maria Zuber, principal investigator of NASA's GRAIL mission, from the Massachusetts Institute of Technology, Cambridge. "We interpret the gravity anomalies discovered by GRAIL as part of the lunar magma plumbing system -- the conduits that fed lava to the surface during ancient volcanic eruptions."

The surface of the moon's nearside is dominated by a unique area called the Procellarum region, characterized by low elevations, unique composition, and numerous ancient volcanic plains. The rifts are buried beneath dark volcanic plains on the nearside of the moon and have been detected only in the gravity data provided by GRAIL. The lava-flooded rift valleys are unlike anything found anywhere else on the moon and may at one time have resembled rift zones on Earth, Mars and Venus. The findings are published online in the journal Nature.

"The rectangular pattern of gravity anomalies was completely unexpected," said Jeff Andrews-Hanna, a GRAIL co-investigator at the Colorado School of Mines in Golden, Colorado, and lead author of the paper. "Using the gradients in the gravity data to reveal the rectangular pattern of anomalies, we can now clearly and completely see structures that were only hinted at by surface observations."

The rectangular pattern, with its angular corners and straight sides, contradicts the theory that Procellarum is an ancient impact basin, since such an impact would create a circular basin. Instead, the new research suggests processes beneath the moon's surface dominated the evolution of this region. Over time, the region would cool and contract, pulling away from its surroundings and creating fractures similar to the cracks that form in mud as it dries out, but on a much larger scale.

Similar rectangular patterns of structures surround the south polar region of Saturn's icy moon Enceladus. Both patterns appear to be related to volcanic and tectonic processes operating on their respective worlds.
For more information about GRAIL, visit: http://www.nasa.gov/grail



Earth's moon as observed with a small telescope or binoculars shows Oceanus Procellarum in the left (West) quadrant below Mare Imbrium. The Moon's libration has carried the features to the left in this image so we are seeing more of Mare Crisium. Mare Marginis and Mare Smythii are right on the eastern edge. Image taken Sep 20, 2013. Exposure was 1/5000, ISO 1000, f.l. =400 mm f/5.6. By the way the name of the band Procul Harum is not connected to Procellarum as I erroneously thought for many years. Wikipedia set me straight. The band was named after a friend's Burmese cat. Boring...

More from BAS Astrophotographers

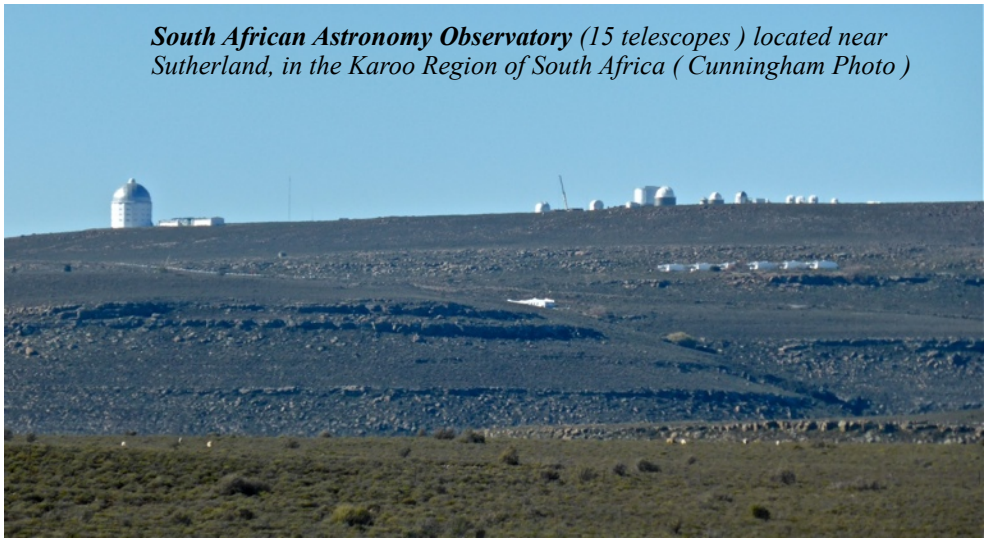
Pacman Nebula NGC 281 by Frank Williams *Frank writes: "It was a dark and foggy night. But desperate times call for desperate astro-imagers. Two hours of the Pacman Nebula (high in sky to minimize fog glow) a bit noisy and fuzzy but have to take what ever sky I can these days. 40 x 3 min exp., 30 flats 10 darks, no bias, no crop, 0.75 focal reducer on Mallicam VRC 12 truss reflector.*

Mars lines up with the "rival of Mars" Antares Sep 28, 2014
by John Hlynialuk *The best night would have been Sep 29, with the Moon directly above Mars and Antares but unfortunately, the weather was bad that evening. This image has an overexposed crescent Moon to the right of the Mars-Antares line. Between the Moon and Mars is a triangle of stars in the head of Scorpius which are interesting observing targets on their own. The star almost touching the finger of cloud is μ-Scorpiae, below and to right is Graffias (β-Sco, a nice double) and the fainter pair of stars is an optical pair, Ω-1 and Ω-2. μ-Sco is actually a quadruple star system and a beautiful sight in any telescope. Below this group and just above the cloud is Dschubba or δ-Sco. Canon 60Da at f/5.0, f.l. 50mm, ISO 1000, 6 s. exp. at 8:25 pm Sep 28.*

SALT- The Largest Telescope in the Southern Hemisphere

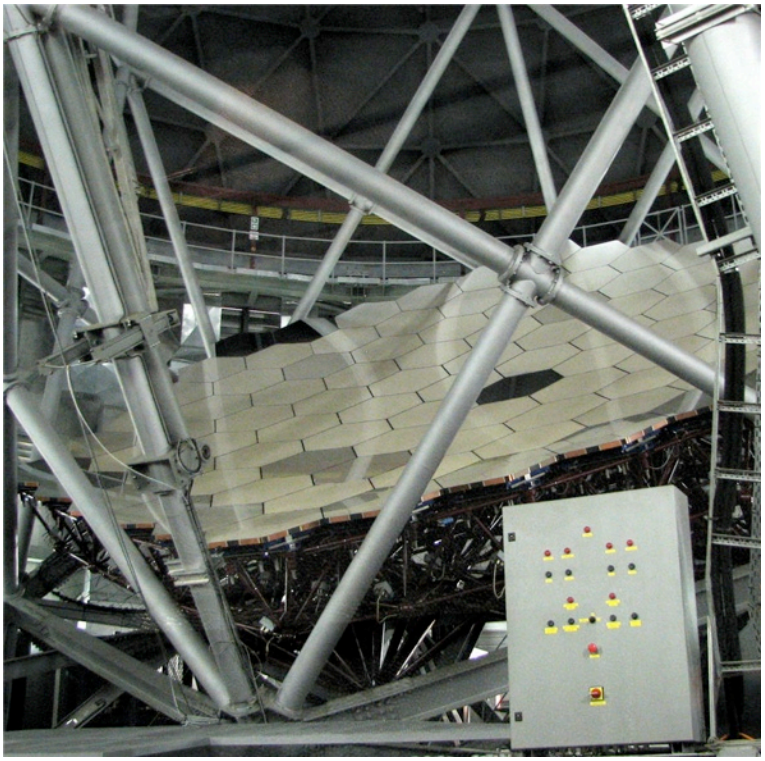
"*Of all tools, an observatory is the most sublime .... The sublime attaches to the door and to the first stair you ascend, ... this is the road to the stars.*"
Ralph Waldo Emerson

You would be forgiven if you thought the largest optical telescope in the Southern Hemisphere was the European Southern Observatory's Very Large Telescope (VLT) on Paranal, located in the Atacama desert of Chile. However, the current record holder is the South African Large Telescope, called SALT. It is located 1800 metres above sea level near the quiet town of Sutherland, in the Karoo semi-desert area of South Africa, about 370 km northeast of Cape Town. This past June and July, Paula and I, along with 6 other Canadians, travelled to South Africa and Namibia to experience their safari animals and the southern stars, on a journey we called a Starfari. So, after spending a few days visiting Cape Town, which, in our opinion, has the most spectacular natural setting of any city in the world, we travelled north, through mountains and wine country, to the South African Astronomy Observatory located in the Karoo region. At this pristine, dark sky site, 7 nations, - South Africa, United States, United Kingdom, Germany, Korea, Japan, and Poland - have constructed 15 observatories containing telescopes of various apertures and optical designs. The attraction is easy to understand because the dry, stable climate of the Karoo, combined with very dark skies, showcase the best of the southern hemisphere's celestial treasures for both amateur and research astronomers.



South African Astronomy Observatory *(15 telescopes) located near Sutherland, in the Karoo Region of South Africa (Cunningham Photo)*

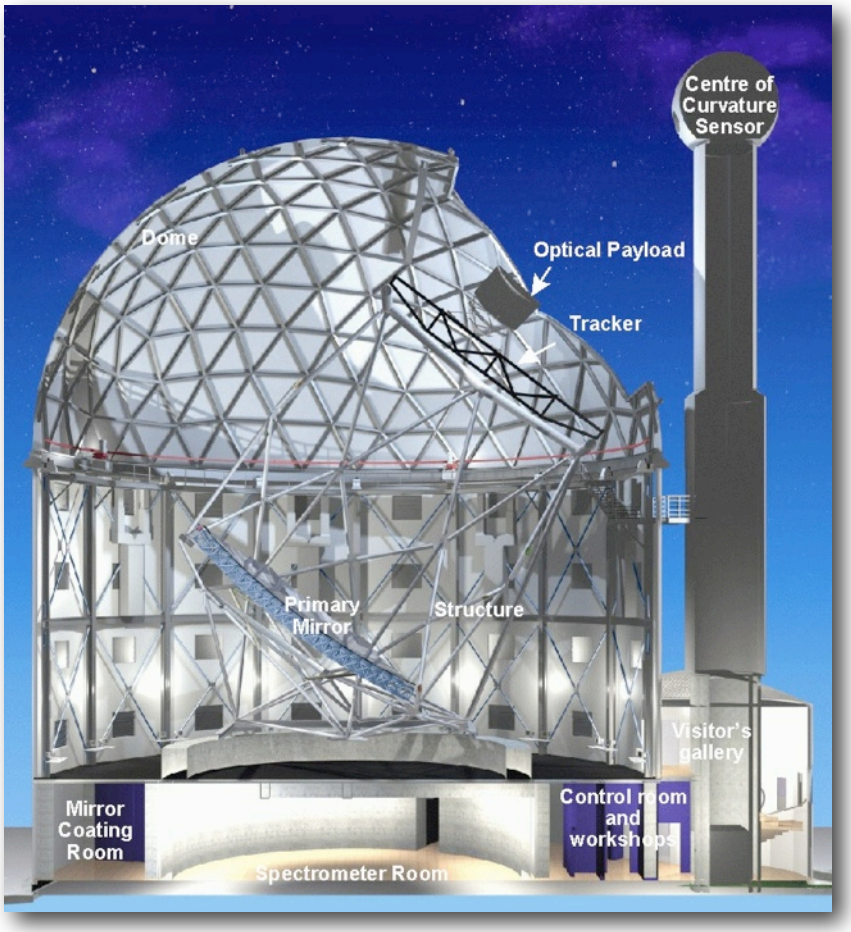
Below: *Main mirror consists of 91 hexagonal segment individually controlled by a centre of curvature sensor. Image from Wikipedia*



Paula and I have visited many observatories around the world but none like SALT! SALT has the strangest optical telescope design in a major observatory that we had ever seen. The optical instruments don't point directly up at the sky; instead, they point down toward a reflected image of the sky mirrored in an 11.1 m x 9.8 m diameter spherical mirror at the bottom of the telescope. This reflective mirror surface is composed of 91 identical hexagonal, one metre mirrors, each of which can be adjusted in their tip and tilt to make the spherical reflecting surface. This bottom reflective surface can only move in azimuth, and the mirror's orientation is fixed at 37 degrees from the vertical to better take advantage for observing the Magellanic Clouds. The various optical instruments comprising the optical payload are positioned on a moveable tracker, located 13 metres above the

Image left: *SALT main building . Prominent tower holds the centre of curvature sensor that helps control the mirror shape. Cunningham photo*

mirror, at the spherical focus. To maintain a spherical focus, a Centre of Curvature Sensor is located at the top of an adjacent tower. This curvature sensor shines laser light to each of the 91 hexagonal mirror and, using a technique known as stacking, the telescope operator can adjust the tilt and tip of individual mirrors to precisely define the mirror's spherical focus. The moveable tracker, containing the optical payload, can now follow reflected sky objects in the large mirror for up to 2 hours without adjusting the azimuth of the mirror. The result is that the optical system can observe 70% of the sky in an annulus-shaped region of the celestial sphere between declinations of - 75 degrees and +10 degrees. The main advantage of this design is economic. Because the main reflective surface doesn't have to track the celestial object, it doesn't require expensive support and tracking mechanisms and, in its place, the instrument payload at the spherical focus does the tracking. This design is an improved version (corrected spherical aberration) of a similar design used at the MacDonald Observatory in Western Texas.



Interior structure of SALT.
Image supplied by Rutgers University, New Jersey

Following our guided tour of SALT, we were given a map of the entire South African Astronomy Observatory site and we walked around it taking photographs of the other national observatories. I particularly enjoyed my conversation with a telescope engineer from South Korea, who was supervising the installation of a new telescope mount. The Sun was now low in the west, and impala were walking around the site as if they owned it. We had booked a stargazing experience at the SAAO Visitor Centre after sunset and we didn't want to be late. The South African lecturer, named Willem Prins, using a Celestron 14 and a Meade 16, gave a wonderful presentation on the visual wonders of the southern night sky. He explained how to find the South Celestial Pole and then showcased the visible planets, coloured double stars, globular clusters, open clusters, nebulae, and galaxies. We marveled how he managed to simultaneously employ both telescopes and, at the same time, present an engaging commentary to the assembled group of 28 people. And then, too soon, his star presentation was over and we had to leave.

What a wonderful day we had! As we drove back to Sutherland on our mini-bus, I had time to reflect on our observatory experience. SALT is now making a name for itself. It has been described as Africa's "giant eye" on the sky. It is the only large research telescope that has the ability to take high speed images of changing celestial objects using sensitive CCD detectors. Because of this, it has discovered a unique class of binary stars called polar binaries, which are comprised of orbiting white dwarfs. SALT has also been instrumental in detecting dynamical changes within quasars when internal gas and dust interact with the quasar's central black hole. Even in the field of extrasolar planets, where most of the recent discoveries have been made by the Kepler spacecraft, SALT has discovered a novel planetary system in which a pair of giant planets are orbiting a close pair of suns.

As man continues to walk Emerson's metaphorical path to the stars, SALT, with its privileged southern sky location and innovative technology, is bound to be a significant contributor to man's understanding of the Universe.

The author and Paula C. at the entrance to the South African Astronomical Observatory -supplied photo

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Sun	Moon	Mars	Mercury	Jupiter	Venus	Saturn

A question that was asked at a recent public viewing night involved the names of the days of the week and their astronomical connection. I actually learned a lot from the questioners and then did some more research. Sunday and Monday (Sun and Moon) are pretty easy to connect to astronomical objects but there are many names we use that are not quite as obvious. See the box at right for the entire list of weekday names and their origins. The item below is some comments about the calendar from an EarthSky.com article recently.

Sunday = "Sun's " day; Latin dies Solis for Sun
Monday = "Moon's" day; Latin dies Lunae for Moon
Tuesday = "Tiw's" day (old Norse god); Latin dies Martis for Mars
Wednesday = "Woden's" day (old Germanic god); Latin dies Mercurii for Mercury
Thursday = "Thor's" day (old Norse god); Latin dies Jovis for Jove or Jupiter
Friday = :Frige's" day (old Anglo-Saxon god); Latin dies Veneris for Venus
Saturday = "Saturn's" day

Month Name CHAOS

The calendar months we currently use today in western society were also Roman based and originally were named in numerical order. eg Otto (8) for October, Nove (9) for November, Dieci (10) for December. However, October is now the tenth month, November is eleventh and December is twelfth. This is because Julius Caesar was either honored or wanted to immortalize his name and added July. Then Augustus [Caesar] thought it was a decent idea and threw in August for himself. The remaining months were pushed two spots down the list. Presto, October is now 10th, November is 11th and December is 12th.

Thirty days has September,
April, June, and November.
All the rest have thirty-one,
Except—you know which one.

The modern calendar has always confused me. I can never remember which month has 30 days and which has 31. Feb is easy, except sometimes it has an extra day. Thank Julius and Augustus Caesar for this mess (partly). There is a rhyme that you get taught (above) but it turns out there are multiple versions with minor differences. Wikipedia lists no less than 30! The one above is the simplest version I found but the fact that other months NOT in the first two lines have "ember" in them, confuses me totally. My dad taught me a knuckle routine that works and does not matter which end you start from. But it is embarrassing to pull out your fists and start numbering them in public. One only gets sympathy from other "calendar dyslexics" like me. -JH

Note: knuckles = 31 days, valleys = 30 exc. Feb 28/29

The World Calendar

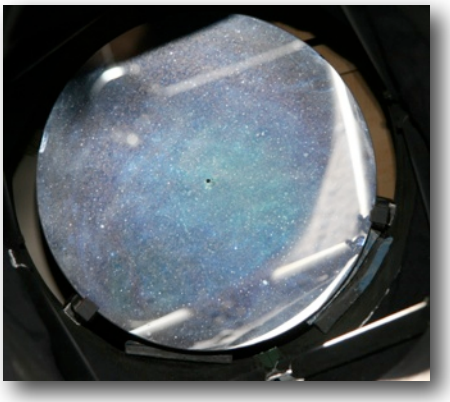
A breath of fresh air, but don't hold it waiting for it to be implemented. Pity.

	January April July October					February May August November				March June September December			
S	1	8	15	22	29	5	12	19	26	3	10	17	24
M	2	9	16	23	30	6	13	20	27	4	11	18	25
T	3	10	17	24	31	7	14	21	28	5	12	19	26
W	4	11	18	25	1	8	15	22	29	6	13	20	27
T	5	12	19	26	2	9	16	23	30	7	14	21	28
F	6	13	20	27	3	10	17	24	1	8	15	22	29
S	7	14	21	28	4	11	18	25	2	9	16	23	30
	Worldsday follows Dec 30; Leapyear Day follows June 30 in leap years which are calculated as usual												W

I have always loved the World Calendar. It's logic just makes so much sense to me. Wikipedia says: *"Proponents refer to the World Calendar's simple structure. Each day is assigned an exact, repetitive date relative to week and month. Quarterly statistics are easier to compare, since the four quarters are the same length each year. Work and school schedules do not need to unnecessarily reinvent themselves, at great expense, year after year. The World Calendar can be memorized by anyone and used similarly to a clock. Because The World Calendar is perpetual, there is no need to churn out copies of it every year [saving in printing costs]".*

There has been a World Calendar Association promoting its adoption since the creation of the World Calendar by Elisabeth Aschelis in 1930. The WCA continues to actively campaign for adoption (possibly in 2017 or 2023). The biggest resistance is from religious groups, some objecting to an 8-day week when Worldsday (in green) is added in. Worldsday has no number and occurs at the end of Dec. Leapyear day after June 30 also is included every leap year. What a beautiful and simple way to keep track of the days of the year! -JH

Building a 12-inch f/6 Truss Tube Telescope -One Amateur's Odyssey *by John Hlynialuk*

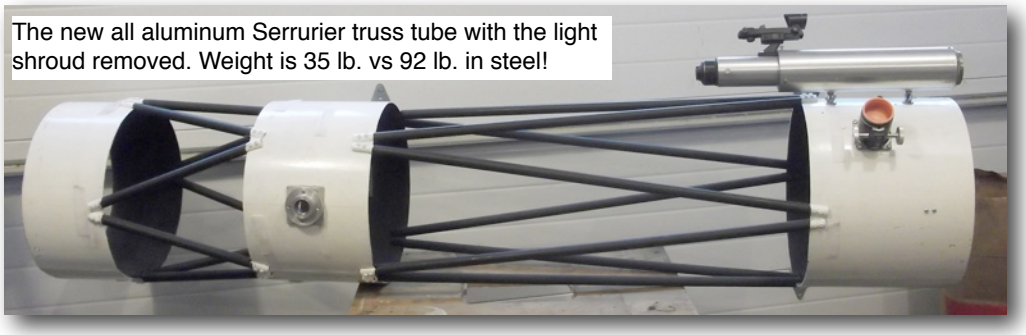


Can you see the difference?

The 12-inch mirror at the heart of Cyclops-1 was re-coated once before in the 34 years I used it and although it looked great at first, that job ultimately turned out to be unsatisfactory. There was a blue haze over the mirror that showed up under certain lighting conditions (image right) and it only got worse as dust and general usage added a layer to the surface. The change was gradual enough that i did not really get turned off until several years after the warranty was up. Anyway, that episode is past now. Normand Fullam's re-aluminizing job is shown at left. Quite a difference!

<u>The Story Continues...</u>(see Oct issue for part-1)

After the original version of the 12-inch had been used and enjoyed for many years, I decided to modernize the telescope and get it motorized so that I could do astrophotography. It was an opportunity to upgrade a lot of the components and lighten the tube considerably. The second generation Cyclops (Cyclops-2) includes a newly-aluminized mirror thanks to Normand Fullam (shipping by Brett!) and is now waiting re-assembly into an all-aluminum truss tube that replaced the original steel construction. I even used the time that the mirror was away and mount was being rebuilt to renovate the roll-off roof observatory in my backyard. The original one had a raised floor inside that served its purpose but with different telescopes I needed to drop the floor a bit and add some new concrete piers for the scopes I would be using. I replaced the single pipe pier that I used for my TV 4-inch refractor with three pads (extending from the original concrete pad) on which to set the Advanced VX tripod legs to support the mount and C-9.25 Celestron Edge HD. The lower floor made all the difference in providing some much-needed head room inside the structure. No more head-banging!



The new all aluminum Serrurier truss tube with the light shroud removed. Weight is 35 lb. vs 92 lb. in steel!

The original steel truss tube of Cyclops-1 had served its purpose as had the mount. The changes that lead to Cyclops-2 were gradual and first involved re-building the truss tube out of aluminum. (Image above). I managed to obtain a surplus 15-inch diameter Al tube from the nice folks at the Carr Observatory and cut cylindrical sections to replace the original steel square and two octagons. Purchased aluminum tubes formed the trusses which were attached in the same basic Serrurier truss pattern of the first scope. A new set of bearings were attached to the central cylinder and these connected to the bearing cones in the ends of the fork arms. I decided to continue to use the steel fork from the first design -too much work to redo that. I have yet to find a suitable replacement in aluminum but I think steel is probably a lot more resistant to the forces perpendicular to the polar axis. Most of the flexure in the fork is at the polar axis as it supports the entire weight of the telescope and attached gear. The structure is like a first class lever where the effort and load are on opposite sides of the fulcrum and the bending will occur at the middle. I decided to leave the fork and polar axis as is, made of less-bendable steel.

I found soon enough that the original polar shaft was too short to accommodate both a new set of bearings and the Byers clock drive gear so I scrounged up a new heavy-wall shaft and machined it to fit the two-inch openings of the flange bearings (that I purchased new) and the 2-inch opening of the clock drive. The flange bearings have a square profile, and they turned out to have the exact dimensions to fit inside 6-inch square tubing. It was a lucky fit!. The whole polar axis has to pivot about its centre as well as up and down to allow for proper fine tuning of the telescope when it comes to polar alignment.

Bolts at the corners allow the whole shaft to be raised or lowered to change the angle of elevation and a slot in each of the holes that holds the bolts allows about 3° of rotation of the upper plate relativr to the lower. The final polar alignment is done using Polaris at night and everything is locked down tight afterwards.

The base (a vertical post, actually) to which the polar axis is attached was cobbled together from 2-inch square steel tubing left over from the original mobile mount on which the Guelph telescope once sat. After the permanent pier was constructed inside the Fox, I had metal to recycle so I made up the central post for the mount by welding the square tubes in place parallel to each other. I don't think there could be a stronger pillar for Cyclops-2 on which to rest. More details on the mount will appear next issue.

Oct 8 Lunar Eclipse Update

For the second time this year, local observers/photographers have been clouded out for a major celestial event. In our area, the Oct 8 total lunar eclipse happened behind thick clouds although a lucky few glimpsed the reddish moon at totality through short-lived breaks. Four early risers who went to Sauble Beach saw a beautiful full moon at 4:30 am but thicker clouds rolled in so that first contact at 5:14 am was obscured. A few breaks in the clouds (image right at 5:53 am) revealed the partially shadowed Moon. The two images below compare the full moon just after it rose (left image at 8:05 pm Oct 7) to the appearance at 4:51 am Oct 8 or 23 minutes before first contact. The right image shows subtle shading effects of the inner umbral edge on the upper limb of the Moon. This effect has been seen by several observers on other occasions but the camera (and binos) see it earlier than the eye does. Note also the rotation of the Moon in the 8 hours between the images.

The image above was taken at 5:53 am, well into the first phase of the eclipse when the Earth's shadow was covering about half of the Moon. Totality had not started and was not observed by the group at Sauble Beach because of clouds. Image above was a 1/4 s exposure through a 4-inch TeleVue refractor at 540 mm (860 mm effectively due to the APC chip). Image was cropped and adjusted with Levels to duplicate the view through the telescope. All images by John H.

Eclipse Images from the Web

I received only one report from Bruce-Grey of a successful observation of the totally eclipsed Moon and that was from Lorraine R. on her way to work. Susan M. observed it also from the Brampton area and Zoë K. near Chatham. On websites like Universe Today and Spaceweather who draw from a wider audience, many great images came in and I have included some of the more interesting ones here.

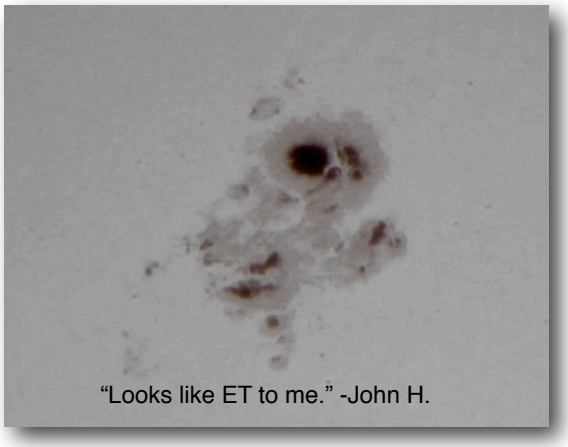
The eclipsed Moon sets over the Andes (Mts. Lopez and Capilla, Bariloche). Credit and copyright: Guillermo Abramson.

The October 8th, 2014, lunar eclipse from Houston, Texas, taken with a 500m lens featuring a statue of Sam Houston. Credit and copyright: Sergio Garcia Rill.

Dayton Ohio
John Chumack image

Lunar eclipse timelapse into totality. Taken from Palmyra, New Jersey on the Delaware River near Philadelphia, Pennsylvania. Night began with stormy clouds and transitioned to clearer skies as the eclipse progressed. Sequence from approx 4AM EDT to 7AM sunrise. Credit and copyright: Frank Miller.

A Fun "Ecliptical" Event



"Looks like ET to me." -John H.

For the 2 dozen or so people who came out to Sauble Beach to watch the Oct 23 partial solar eclipse, the event started off with the sun in clear blue sky. And even when clouds near the horizon interfered with the view, it did not detract from the enjoyment of the event. Two H-alpha scopes, two small reflectors and a 4-inch TeleVue refractor provided lots of variety in the closeup views but the giant sunspot was visible to the naked eye (protected by proper filters of course). That giant sunspot provided a bonus that made this eclipse particularly memorable. It appeared over the eastern limb a week ago and is currently "aimed" right at Earth . The veteran solar observers among the viewers, some going back 40 years, were amazed at the size of this group. APOD for Oct 22 had a video showing sunspot group AR 2192 crackling with flares like lightning bolts seen in Earth's clouds from the ISS. AR 2192 was reported to be 10 times the size of Jupiter which is itself 11 times larger than Earth! Incredible! Even more interesting was the observation by some that the sunspots looked like ET. One observer whimsically observed that if you looked at it upside down, it looked like a running chicken. (Names have not been divulged to relieve those folks from scorn...)

Images shown here were taken through a 4-inch TeleVue refractor, at about 80x using an afocal system (a 26 mm Pl eyepiece). Exposures about 1/320 s, ISO 200 with a Canon 60Da. Last image was taken about 25 minutes before sunset and shows atmospheric dispersion causing reddish/greenish fringes to the edges of the sun and moon's disk.

Image right was taken just 4 minutes after first contact which came on time at 5:36 pm EDT and was noticed first by Cheryl D. At that time the sun was still over 6 degrees above the western horizon. **Image below** taken at 5:52 pm EDT shows a much larger chunk taken out of the sun by the moon. About this time the sun moved into the cloud belt just above the western horizon.

Image right was taken through a break in the cloud bank and shows the largest bite by the moon that we saw. Atmospheric turbulence has taken its toll, producing wavy edges and colour fringes. Image taken at 6:19 DST just 7 min. before predicted sunset time 6:26 pm .

Eclipse Images by Cellphone

Jana G. writes: *These pics are thanks to Lorraine and her savvy use of my iphone camera. It was fun to capture the event so simply. Astrophotography 101 for beginners by Lorraine: all that is needed is a good cellphone camera and a steady hand. The lens of the camera is placed right in front of the viewing lens of the scope or directly on it. (These are 2 of 10 Jana shot.)*

Aquarius (Aqr)

α Aquarii - Sadal Melik
β Aquarii - Sadal Suud
γ Aquarii - Sadal Chiba
δ Aquarii - Skat
ε Aquarii - Al Bali
θ Aquarii - Ancha
κ Aquarii - Situliu

Aquarius is a rather faint zodiacal constellation of comparatively wide extent; its most prominent feature is the small group of stars known as the "Water Jar" (see chart). These four stars form a Y-shaped group; the ancients pictured the Water Jar as being inverted and pouring a stream of water into the mouth of the Southern Fish (Piscis Austrinus), represented by the first magnitude star Fomalhaut. Scan with fieldglasses the field from the Water Jar to Fomalhaut; there are many attractive pairs and groupings representing the trickling water. ζ Aquarii, the first star in the stream, is an attractive red star. Also of interest is the fact that Neptune was first discovered in Aquarius in 1846, after its presence and location had been predicted and calculated from irregularities in the orbit of Uranus.

DOUBLE STARS

	Mag	Sep(s)	Location	Remarks
ζ	4.4-4.6	3	222600	Pale Green-Pale Yellow, beautiful
τ1	6.0-9.2	26	224514	Unusual contrast
ψ1	4.5-10.	49	231209	Yellow-Blue, fine contrast
4	6.4-7.2	1	204906	
12	5.9-7.3	3	210106	
41	5.6-7.4	5	221121	Topaz-Blue
53	6.4-6.6	6	222417	
94	5.3-7.	13	231614	Pale Yellow-Blue, good contrast
107	5.7-7.0	6	234319	Fine colours
Σ2809	6.0-8.4	31	213500	

MESSIER OBJECTS (Sco)

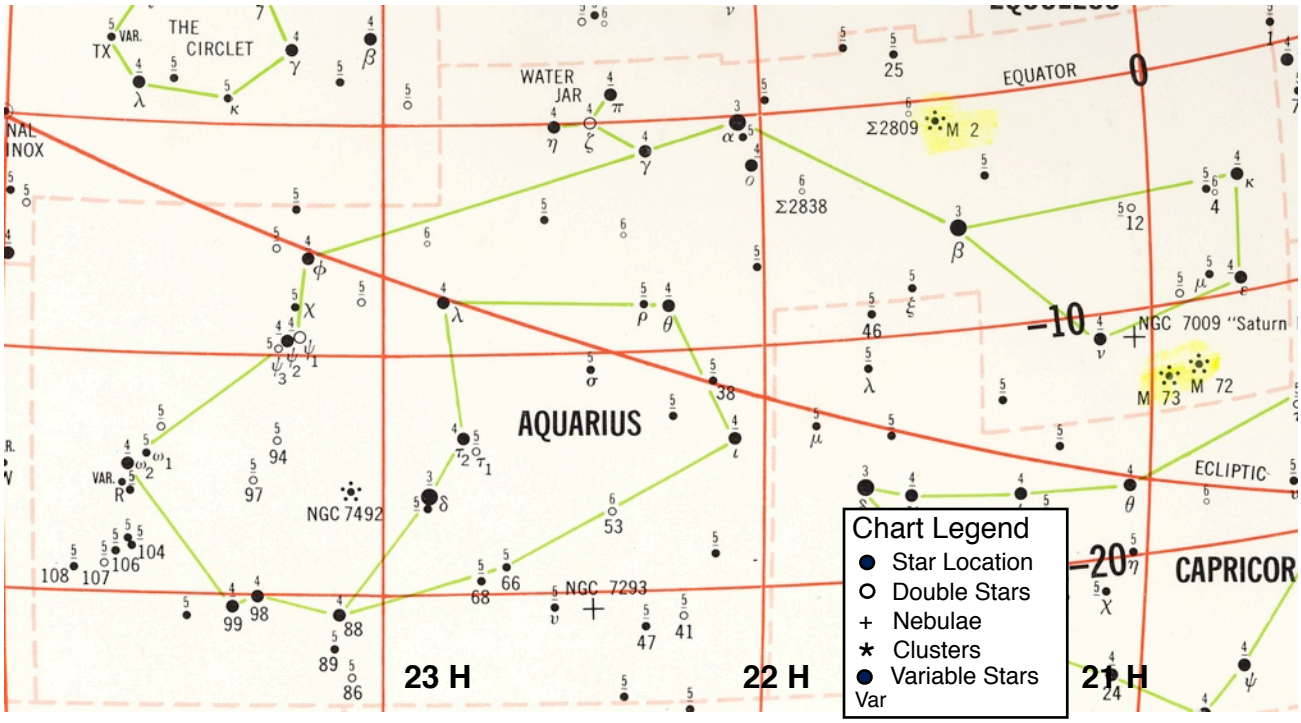
	Mag	Location	Remarks
M2	6.3	213101	Globular Cluster. Beautiful; visible in small scopes
M72	9.8	205113	Globular Cluster.
M73		205613	Open Cluster.

Other Objects of Interest in Aqr

NGC 7009 - A planetary nebula, the so-called "Saturn Nebula." Seen as a pale blue disc. Location 210212.
NGC 7293 - Planetary Nebula Location 222721 [Helix Nebula -ed]
R Aquarii -long period variable (387 d), magnitude range 5.8-11.0. Location 234116.

At magnitude 7.3 the Helix Nebula is a large planetary nebula and the brightest in the sky. At its widest point the main nebula covers 18 arc minutes with the much fainter outer halo spanning some 28 arc minutes – close to the diameter of the full Moon. Based just on this information it would seem to be an easy target and indeed it is visible with just binoculars at a dark site on a moonless evening. But it can disappoint in a telescope because it has low surface brightness. The low surface brightness meant that Charles Messier failed to spot it. Even the two great astronomers, Sir William and Sir John Herschel, failed to notice it during their sky searches until German astronomer Karl Ludwig Harding eventually discovered it sometime before 1824.

A 100mm (4-inch) telescope can reveal finer structural details with patient observing. Through a 200mm (8-inch) telescope, it is better, appearing as a slightly large oval ring with two thick arcs, gaps and variations of brightness visible across the structure. A nebula filter of the UHC (Ultra High Contrast) or OIII (Oxygen III) variety when used with averted vision and patient observing helps bring out even more subtle details. However, just a small amount of light pollution blots out these details. The central star of the Helix Nebula is of magnitude 13.4 and hence only easily visible in the largest of amateur telescopes. Knowing what to expect can help you see more of this elusive target.



Nov 01 11:00 Mercury at Greatest Elongation: 18.7°W
02 23:21 Moon at Perigee: 367 871 km
DST ends; turn clocks back one hour.
04 07:10 Mercury 3.9°N of Spica
05 12:00 S. Taurid Meteor Shower 10/h but Moon is Full
06 17:23 **Full Moon** rises 6:23 pm EST "Frosty Moon"
08 14:41 Aldebaran 1.4°S of Moon
12 11:00 N. Taurid Meteor Shower 15/h Moon is LQ
14 10:16 **LQ Moon** rises locally at 12:26 am EST
12:39 Jupiter 5.2°N of Moon
20:56 Moon at Apogee: 404 338 km
15 05:05 Regulus 4.6°N of Moon
17 17:00 Leonid Meteors 20/h, peak 7 pm, Moon 20%
18 03:00 Saturn in Conjunction with Sun
19 11:01 Spica 2.6°S of Moon
22 07:32 **New Moon** rises locally at 7:26 am EST
27 18:11 Moon at Perigee: 369 825 km
29 05:06 **FQ Moon** rises locally at 2:03 pm EST

BAS/Astronomy Events

Nov 2 Daylight Saving Time ends 2:00 am Turn clocks back 1 h.
Nov 5 Wed **BAS meeting** Grey Roots Museum 7 pm Member's Night and Gadget Night
Nov 6 Thu **Full Moon** "Frosty Moon"
Nov 12 Wed **Philae lands on Comet 67/P C-G**
Nov 17 Mon NM-4 **Leonid meteors** 20/h at peak 7 pm, Moon 20%, waning, not a major shower this year
Nov 20 Thu NM-2 **Asteroid Juno (magnitude 9.1) occults 7.4 magnitude star SAO 117176**. Drop in mag. will be 2.3 magnitudes a noticeable change. Ground track N of Huntsville, ON. No expeditions planned.
Nov 22 Sat **BAS viewing at** ES Fox Observatory.

Special Events

Comet and Mars

November seems to be a slow month in visual astronomy so I fall back on another of the many events that happened in October. This image was just released by NASA showing a Hubble Space Telescope composite of Comet Siding Spring and Mars at about the time of closest passage. Because Mars is much brighter, it was imaged with a very short exposure and then composited with longer exposures of the comet to give us a view of what it would have looked like.

This composite NASA Hubble Space Telescope Image captures the positions of comet Siding Spring and Mars in a never-before-seen close passage of a comet by the Red Planet, which happened at 2:28 p.m. EDT October 19, 2014.
Image Credit: NASA, ESA, PSI, JHU/APL, STScI/ AURA

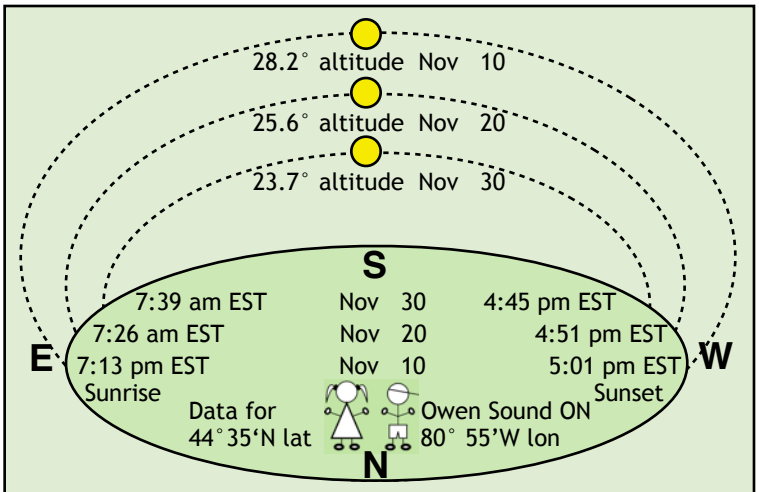
See the whole story here:
http://www.nasa.gov/press/2014/october/close-encounters-comet-siding-spring-seen-next-to-mars/#.VEsglihQfDU

Planets

MERCURY, is well placed early in Nov (max. elong 19° Nov 1). It drops back towards the sun in late Nov. Look before dawn above Spica.
VENUS, was behind the sun in late October and is still very close to the sun at sunset. Better viewing in December. **MARS** (mag. 0.9) continues its trek eastward across Sagittarius in November. Look for it near the globular cluster M22 on Nov 6. **JUPITER**, (-2.1) rises in the east around midnight and will rise an hour earlier by month-end. **SATURN,** (mag. 0.5) is on the western horizon at sunset and passes behind the sun on Nov 18. Better viewing in the dawn sky late December. **URANUS,** (5.8) and **NEPTUNE,** (7.8) rise before sunset this month and are in good viewing position all November. Uranus was at opposition on Oct 7. Both **asteroid, Vesta (7.1)** and dwarf planet, **Ceres (8.3)** are low in the evening sky between Mars and Saturn. They set only an hour after sunset so their viewing season is drawing to a close. Charts available on the BAS website. **PLUTO** (mag. 14) is in Sagittarius near Mars. The two are less than 5° apart mid-month. Pluto 2014 charts are now found on the BAS website.

The diagram below gives the sunrise/sunset times and the Sun's altitude for Nov. The Sun continues to lower in elevation all month.

The November moon phase graphic below shows lunar phases for each night of the month. Times of moonrise for NM, FQ, FM and LQ are given in the Calendar listing at left.



Nov 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6 FM	7	8
9	10	11	12	13	14 LQ	15
16	17	18	19	20	21	22 NM
23	24	25	26	27	28	29 FQ
30						

By permission Univ. of Texas McDonald Obs.

BAS Member Loaner Scopes

Solar H-alpha scope now out on loan.

Our Lunt solar scope can be borrowed by BAS members but 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.

One 12-inch Dob available.

Only one 12-inch loaner telescope is available for free loan by members. The other is temporarily under repair. Other scopes like **8-inch dobsonians** are available, however. Contact John H. or Brett T. for availability. Scopes come in and out so keep checking with John or Brett if you are interested in a loaner.

SGN Classified Ads Section

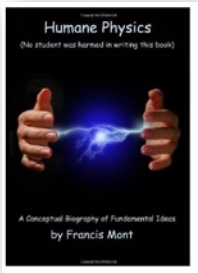
(Now also on our website)

FOR SALE: Meade Lightbridge 16" Dobsonian

Azimuth bearing upgraded to Teflon and textured Formica bearing. Includes AstroZap shroud and Telrad unit finder. The truss tubes and castings were originally bright white! I recoated them in flat black header paint after a light sandblasting. I have also modified the Rocker/Base Assembly using "knock down" fasteners. This bulky assembly can be assembled or disassembled in about five minutes with one Allen key for flat storage in a car trunk. The Lower Optical Assembly will fit into the backseat of my Corolla. This is a relatively transportable "Light Bucket" priced at $1300. Make me an offer! Brett Tatton ph: (519) 389-6010 or: bretttatton@gmail.com

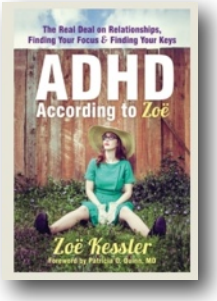
Note: Actual scope does not have a handle under focuser or re-inforced base (near eyepiece rack) as shown in image above.

For Your reading Pleasure/Enlightenment:



Humane Physics
Physicist Francis Mont has published the first of two volumes on the history of Physics and has a book store just south of Chatsworth. Contact Francis directly for a copy or go to www.montland.ca

Other works by the same author include ***Adoption Reunions***, now in its 21st year in print. See www.zoekessler.com for more or contact her directly for copies.



FOR SALE: Canon EOS T-adapter

Connect your Canon camera to other components with a T-adapter. Bayonet mount connects directly to camera body. Other end has a removable threaded section that can be replaced with a 2-inch barrel for a 2-inch eyepiece holder. Contact John at 519-371-0670 or at stargazerjohn@rogers.com. I can do some machining to customize this item to your telescope as well (for a small fee/materials cost).

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. Contact Anton VanDijk 519 376-9912 ravand@rogers.com

Price reduced to $600 !

The Cartoon Corner

HARPOONS from www.xkcd.com

|< < PREV RANDOM NEXT > >|