Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 6 No. 12 Dec 2012

Hang your stockings with care. You never know what Santa Nagler is bringing for Christmas. Hope your holidays are happy and full of the spirit of the season, -as well as clear for a night or two for a brief star-gazing session! -ed

December 2012 Contents

BOEC declared a Dark Sky Preserve by RASC

Dark-Sky Preserve (DSP)

A Dark-Sky Preserve is an area in which no artificial lighting is visible and active measures are in place to educate and promote the reduction of light pollution to the public and nearby municipalities. Sky glow from beyond the borders of the Preserve will be of comparable intensity, or less, to that of natural sky glow.

On Nov 3, 2012, the executive of the Royal Astronomical Society of Canada, gave Dark Sky Preserve status to the Bluewater Outdoor Education Centre. This designation is given to an organization sponsored by a local astronomy group, in this case the Bluewater Astronomical Society. Using as a guide the documents created by Rod Steinacher for the Bruce Peninsula National Park, site manager Deb D. and BAS vice-president John H. submitted an application to RASC in June 2010. After some minor changes, RASC deemed BOEC acceptable as a dark sky site in Nov of 2012.

As a Dark Sky Preserve, BOEC (and sponsor BAS) need to have an active program of education about the effects of light pollution. This is done as a matter of course at the BOEC because it's raison d'etre is environmental awareness. Similarly, most presentations to the public by our outreach group have a message that dark skies are worth preserving as a legacy to our children and ecologically healthy.

Now that BOEC is an official Dark Sky Preserve it means that any approaches we make to local municipalities about lighting issues will have a bit more clout. Wouldn't it be something if the entire Bruce Peninsula were a DSP? This is not altogether an unreachable goal. Stay tuned.

The Milky Way Summer Triangle sinks into the SW horizon in this Sep 15 image taken from the ES Fox Observatory. Note Lyra in the centre of the image. The handle of the Big Dipper is at lower right and Polaris and Ursa Minor are at upper right.
Canon 50D image by John H. Exposure = 30 s, ISO 2000, 10 mm lens at f/2.8

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GREY ROOTS MUSEUM & ARCHIVES

INSPIRED BY NATURE — INSTITUTE FOR OUTDOOR EDUCATION AND ENVIRONMENTAL STUDIES

The Bluewater Education Foundation

Ontario Trillium Foundation / Fondation Trillium de l'Ontario

BAS Events for Dec 2012

Dec 5 BAS Meeting Grey Roots 7:00 pm
Speaker: John Hlynialuk "Christmas Star"

Dec 13 BAS Viewing Geminid Meteors (120/h) @dark
ES Fox Observatory

End of Year Report

This time last year we were reporting on the awarding of a Trillium grant to BAS. Well, the year-long shopping spree is over and we have now spent every penny of the money supplied. Some things went as planned, others better than planned. In the latter category is the purchase of the Webster telescope. The original budget called for a 20-inch aperture telescope and we managed to snag a 28-inch Webster! Not only that but there were funds available to acquire a trailer as well and now we have a mobile public outreach telescope that has made several trips to public viewing sessions at Grey Roots. There was also the first of what should become annual trips to Starfest. The Webster was the largest scope there this year and no doubt this attracted the largest group of BAS members to the annual stargazing convention -a total of around 20 appeared at various times.

On the down side, we did not get as large a selection of eyepieces as originally planned nor a Boltwood Cloud Sensor; money was diverted to the larger telescope. Also when I first wrote this, a collaboration with UWO on a Meteor Camera had not yet materialized. But I am happy to say that contact has been made and a camera could be in place this spring.

The other big news this year is the designation of the BOEC as a Dark Sky Preserve. RASC has conditions that need to be met including both a dark sky site as well as public education programs about light pollution. RASC also expects the DSP to be active in promoting the use of full-cutoff fixtures and reduction of excess light use within its boundaries as well as approaches to local municipalities, homeowners, etc. with education about the benefits of proper lighting. BOEC is ahead in this game since an offending streetlight at the corner of Bruce 13 and Spry Lake Rd was removed by the municipality. Furthermore, South Bruce Peninsula has a Dark Sky Community Proclamation in place. Also a large number of streetlights along Bruce Rd 8 through Hepworth have been replaced with full cut-off fixtures. All in all, not a bad year.

An astronomer is on an expedition to Africa to observe a total eclipse of the sun, which will only be observable there, when he's captured by cannibals. The eclipse is due the next day around noon. To gain his freedom he plans to pose as a god and threaten to extinguish the sun if he's not released, but the timing has to be just right. So, in the few words of the cannibals' tongue that he knows, he asks his guard what time they plan to kill him.
The guard answers, "Tradition has it that captives are to be killed when the sun reaches the highest point in the sky on the day after their capture so that they may be cooked and ready to be served for the evening meal".
"Great", the astronomer replies.
The guard continues, "But because everyone's so excited about it, in your case we're going to wait until after the eclipse."

Merry Christmas from BAS

Harvest Dinner Well-attended

by John H. with excerpts from Rob Gowan Sun Times staff

The 3rd annual Harvest Dinner crowd was two short (74) of a full house. The speaker Robert Burcher, no doubt, was responsible for the last minute surge in ticket sales. An article in the local paper described his recent discoveries that may lead to a re-thinking of the common view that the first visitors to North America were Vikings. Burcher's studies of chiseled markings in Newfoundland and elsewhere seem to show that perhaps Phoenicians (from the eastern Mediterranean) found their way to North America well ahead of the Vikings. The Phoenician culture is dated to 3000 BC.

The amateur archeologist from the Beaver Valley who spent two months in Newfoundland during the summer studying ancient rock inscriptions is starting to garner attention from the academics who have long dismissed him. If he is right and the inscriptions he has studied are from ancient European cultures, it could rewrite North American history. The prime subject of Burcher's Newfoundland trip is a rock known as St. Brendan's Boulder or Irish Rock in the community of St. Lunaire-Griquet. An inscription on it has been identified as looking like Tartessian by a professor at the University of Wales who is a renowned expert on the language. The language is from a culture that existed thousands of years ago in what is today Spain and Portugal. It is Burcher's belief that members of the society made their way to North America more than 2,000 years ago in search of copper.

Another inscription on an island in Placentia Bay in southeast Newfoundland has been identified by an expert at the Royal Ontario Museum as Phoenician, a culture that was centered in modern-day Lebanon and dates back 3,000 years.

A third inscription Burcher has been studying near St. John's is believed to be Latin. A professor at the Centre for Medieval Studies at the University of Toronto saw what might be a date of 500 AD buried in the inscription. Academics at Trinity College in Ireland are also studying it.

Burcher said even though he is now garnering support in his theories, he is not about to gloat. He is just satisfied that his story can be told. "It validates native people, it validates Celts, it validates Newfoundlanders, all of these people who knew there was something important with their rock carvings, with their inscriptions and with their history and the mainstream of history wasn't supporting that," said Burcher.

The work Burcher is doing is an attempt to find further evidence that peoples from across the ocean made it to North America long before the Vikings in 1000 AD and before Christopher Columbus in 1492.

BAS was well represented by members including a couple from "away". John and Janet H. now reside in London ON, but made the trip to attend the dinner and re-aquaint themselves with other BAS members. These included Elizabeth B., Dan G., Sandra L. and John L. (whose carving board brings top dollar in the silent auction every year.)

Martha Bennett and Patti Wilson of the Southampton Chambettes presented a cheque for $200 in support of the ES Fox Observatory. This is not their first show of support as the Chambettes contributed to the building campaign as well during the previous year. "Thank You!" on behalf of BAS, BEF and the students of BWDSB.

Our emcee this year, Dan G. has raised the bar of the job to a high level. As the "maitre-d" for the evening, Dan did more than "supervise the waiters" -he kept things running smoothly, and elevated the dress code for future emcees substantially.
Well done, Dan!

Harrison "Jack" Schmitt speaks at UWO by John Hlynialuk

During the first EVA of Apollo 17, Eugene Cernan photographed Harrison Schmitt with the American flag and the Earth (400 000 km away) in the background. The chest-mounted RCU and the camera bracket are clearly visible. Cernan is visible in the reflection in Schmitt's helmet visor in the awkward position he assumed to obtain this image.
During the talk at UWO, Schmitt mentioned that he made sure that Cernan had the colour camera so that all the pictures of Schmitt would be colour and not B&W. **Credit NASA photo**

Harrison Schmitt is commonly referred to as "the last man to walk on the moon". More correctly, he was "the last of the astronauts to set foot on the moon". The story is complicated by the fact that Eugene Cernan preceded him out of the LM named Challenger and Schmitt followed him (hence Schmitt is the last man). After the third and last lunar excursion, Schmitt entered Challenger first and Cernan followed him in. Technically, Cernan was the last human to stand on the moon, while Schmitt was the last human (of the astronaut corps) to step onto the surface. Cernan made the departing (and somewhat rambling) speech from the moon. it was not as memorable as Armstrong's shorter and more meaningful "small step" phrase. I am not sure how Cernan feels about being left out, but, to his credit, he has not made a big fuss about it.

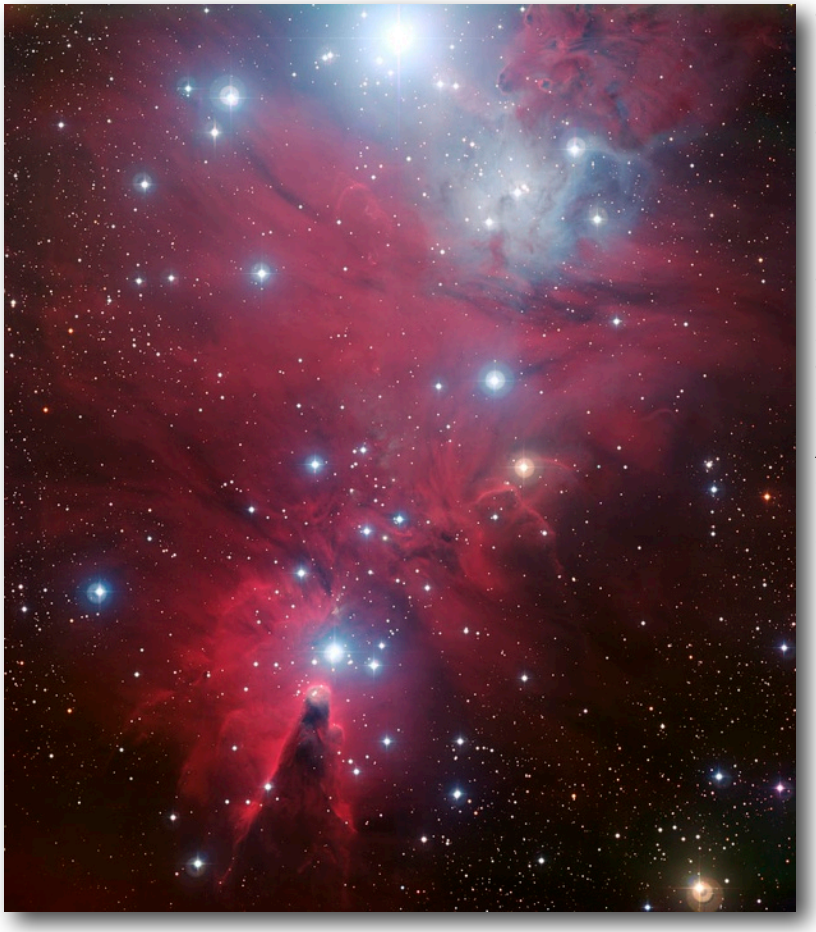
On Nov 16, 2012, Harrison "Jack" Schmitt, spoke at two occasions at UWO as part of the 9th Distinguished Lecture Series of the Centre for Planetary Science and Exploration. During the panel discussion in the afternoon, he described his vision for future space exploration (more fully detailed in his book, "Return to the Moon" reviewed on pg 11) which makes a case for using the moon as a stepping stone to Mars. During the panel discussion with space notables including Canadian Astronaut Bjarni Tryggvason and Peter Worden, NASA Ames Center Director, all agreed that going to Mars was a big project and probably would not happen soon (a generation or so). The tone, I found, was rather discouraging and provided no vision for young folks to latch onto as happened in the early days of space exploration.

Worden mentioned that even getting to the moon would be difficult since the recent cuts to the Constellation program involved cancelling the new lunar lander. Worden explained that the hardware in development now would, however, allow missions to asteroids. He felt that the possible resources available there as well as the fact that asteroids (and comets) pose impact threats makes them likely targets for exploration. Most of the other panelists preferred Mars as the ultimate target.

One question that was interesting was one asked by an audience member: "How many people would go to Mars if they knew it was a one-way trip, i.e. as permanent settlers?" About half of the audience volunteered -it was definitely a space-exploration biased crowd! [My hand went up pretty quickly, too.-ed]

More related stories are found on page 11 "Return to the Moon" -a review of Schmitt's book, and page 12, "Apollo 17 Orange Soil..."

A Christmas Cluster and...



This colour image of the region known as NGC 2264 — an area of sky that includes the sparkling blue baubles of the Christmas Tree star cluster — was created from data taken through four different filters (B, V, R and H-alpha) with the Wide Field Imager at ESO's La Silla Observatory, 2400 m high in the Atacama Desert of Chile in the foothills of the Andes. The image shows a region of space about 30 light-years across.

If you are having trouble seeing the Christmas Tree, the point of the tree is the bright star near the Cone Nebula at the bottom of the image. Draw two lines of stars towards the upper left and right and then make the base go through the brightest star at the top centre. Voila, a Christmas Tree. The trunk runs from the point star near the Cone (the Angel, if you like) which is a magnitude 7.15 star. The bright star at the top of the image which is 15 Monocerotis and it's magnitude is 4.56.

*According to the New General Catalogue, NGC 2264 is **both** the cluster and the Cone Nebula. Included in this image is the Fox Fur Nebula at the top right corner and the Snowflake Nebula in the middle which shows up better on the infrared image.* ***Credit ESO***

Image Right: *HST took this image of the tip of the Cone Nebula in 2002. The Cone Nebula is like M16, the Eagle Nebula. These pillars of cold gas, are common in large regions of star birth. Astronomers believe that these pillars are incubators for developing stars.*

Shooting Stars for the Holidays

The Dec 13 Geminid Meteor shower this year is at a perfect time this year (New Moon) for observing except for the fact that it is December. Weather is decidedly the factor that dictates the visibility of these shooting stars. As long as the weather cooperates, viewing will be held at the Fox Observatory on Thursday night after dark. It is a moonless night, so viewing through the telescopes at the Fox will be good (clouds permitting) if a bit on the cool side. Hopefully, there will not be too much snow on the roof that needs to be cleared. Come dressed for winter, of course! Hot chocolate will be supplied!

The **Geminids** are a meteor shower caused by the object 3200 Phaethon, which is thought to be a Palladian asteroid. This would make the Geminids, together with the Quadrantids, the only major meteor showers not originating from a comet. The meteors from this shower are slow moving, with the time of highest intensity being the evening of the 13th this year -right at New Moon. The shower is thought to be intensifying every year and recent showers have seen 120–160 meteors per hour under optimal conditions, generally a few hours on either side of the peak. Geminids were first observed in 1862, much more recently than other showers such as the Perseids (36 AD) and Leonids (902 AD). [From Wikipedia with some editing -ed]

Monster Geminid Meteor Fireball over Mojave Desert *A beautiful shot of a Geminid Fireball by **Wally Pacholka**. Note Orion in the background. The trail is at least 25° long and as bright as a full moon when it burst.*
This image is for sale at his website www.astropics.com. Look in the Meteors section. Taken at 3:29 am Monday, Dec 14, 2009 during the Gemini Meteor Shower, this is one of the [brightest] fireballs recorded [for that shower].

Happy Holidays From Vesta

Near-True Color Image of Snowman

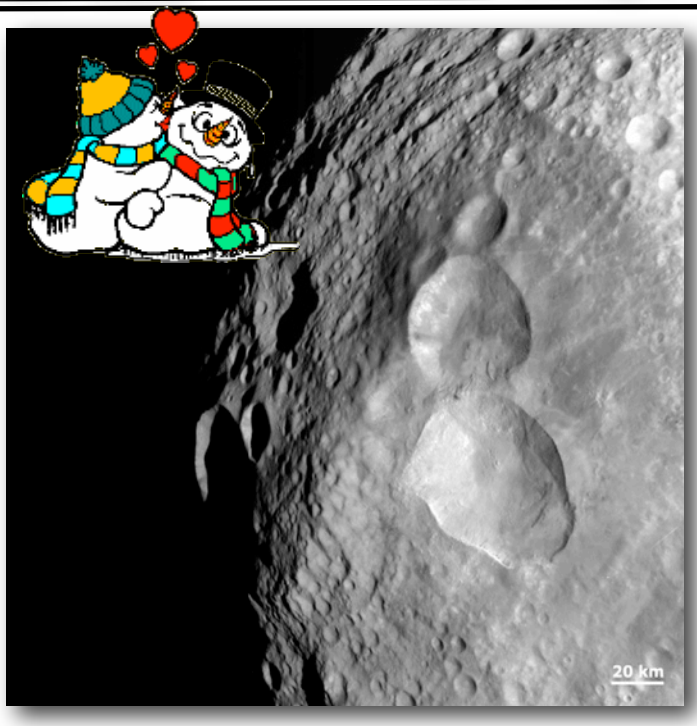
May 10, 2012 - PASADENA, Calif. -- Three impact craters of different sizes, arranged in the shape of a snowman, make up one of the most striking features on Vesta, as seen in this view from NASA's Dawn mission. In the view below, the three "snowballs" are upside down, so that the shadows make the features easily recognizable. North is to the lower right in the image, which has a resolution of 70 m per pixel.

The image is composed of many individual photographs taken between October and December 2011 by Dawn's framing camera. They were obtained during the high-altitude mapping orbit, at about 680 km above Vesta's surface.

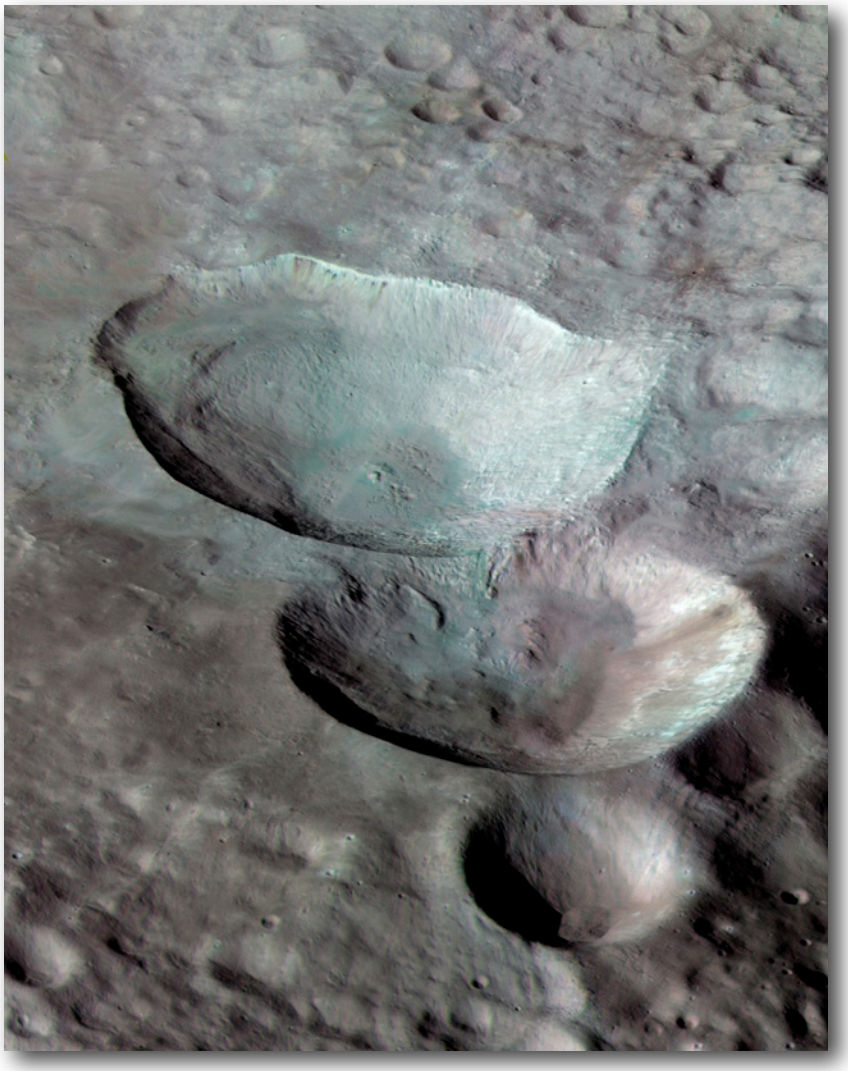
The largest of the three craters, Marcia, has a diameter of about 60 km. The central crater, which is about 50 km in diameter, is named Calpurnia, and the lower crater, named Minucia, has a diameter of about 22 km. Marcia and Calpurnia are possibly the result of an impact by doublet asteroids, whereas Minucia was formed by a later impact.

To derive the color information, scientists combined images acquired by the framing camera in two near-infrared channels (0.917 microns and 0.749 microns) and an ultraviolet channel (0.438 microns). The true colors of the surface of Vesta differ somewhat from what is displayed here, but this mode of reproduction allows subtle changes in material properties across the craters and material ejected from impacts to be detected. In both Marcia and Calpurnia, landslides can be seen; also, dark material has been exposed below the rim of Marcia.

The Dawn mission to Vesta and Ceres is managed by NASA's Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, for NASA's Science Mission Directorate, Washington. UCLA is responsible for overall Dawn mission science. More information about the Dawn Mission is online at: http://www.nasa.gov/dawn.
Image credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



An earlier image of the "Snowman" -craters Marcia (largest), Calpurnia and Minucia (smallest) is shown in this image taken by the orbiting Dawn spacecraft. Image credit: ***NASA/JPL-Caltech/ UCLA/MPS/DLR/IDA***



From the Dawn Journal

by Marc Rayman,
Chief Engineer/ Mission Director, JPL
http://dawn.jpl.nasa.gov/mission/journal_10_31_12.asp

Dawn departed from Vesta only last month, its orbit is not yet dramatically different, but over the course of the coming years, the effect of the thrusting will be to change the orbit tremendously. To reach Ceres in 2015, the ship will enlarge and tip its elliptical course to match the motion of the dwarf planet around the sun.

As of Oct 31, Dawn was 1.0 Million km from Vesta, 252 Million km from Earth, 58 Million km from Ceres, and 385 Million km from the Sun. Generally, Dawn is headed straight towards Ceres, but both follow curved paths around the sun and the spacecraft has to go about half-way around the sun to catch up to Ceres. This it will do, if all goes well, in August, 2015. Dawn will stay in orbit until Jan 2016 which is the end of its official mission.

Nature Delivers ...
"When One Door Closes , Another Opens"

"When one door closes, another opens;
but we often look so long and so regretfully at the closed door
that we don't see the one that opens for us."

Alexander Graham Bell

What can you say when you have travelled halfway around the world to stand in the shadow of the Moon, and have tried your best to plan for all the vagaries of the clouds and weather, and you still are clouded out at totality? Paula and I had joined the November 14th, 2012 Civilized Adventures "Australian Eclipse Expedition", which was organized and led by Don Hladiuk (image right) of Calgary. We really like Don and appreciate how he frames the eclipse experience with the culture of the country we visit. Don had the enviable reputation of having led 13 successful eclipse expeditions to varied locations around the globe and having never been clouded out! We had planned to observe this 2 min 4 s eclipse near the centerline from the beach at Port Douglas, Australia. Unfortunately, for all the eclipse chasers, a huge coastal weather system was stalled over the NE part of Australia and located right over the centerline! To make matters even more challenging, this eclipse was to be an early morning eclipse, with totality occurring at 6:39 local time, when the eclipsed Sun was barely 15° above the eastern horizon. We were not encouraged because the morning prior to eclipse day dawned with major overcast which totally obscured the whole eastern sky. Time to prepare a backup plan! Don spent that day reconnoitering a backup site located inland over the coastal mountains of the Great Dividing Range. If needed, it would take us about 2 hours, driving by bus, to reach this site.

Talk about conflicted! The weather eclipse morning dawned differently than the previous morning. At 3:00 AM, there were stars over most of the sky! But, there was one exception. The view of our eastern horizon from the beach, in front of our hotel, had a huge cloud bank rising up to 20 degrees. The Sun would never make it above that elevation at totality! It was time for the alternate plan to drive over the mountains.

We arrived at our alternate observing site about 5:00 AM and were greeted by stars over most of the predawn sky. Although a few clouds hung over the Coastal mountains to the east, they didn't appear high enough to compromise our view at eclipse time. We were encouraged! Well ... weather can change quickly in a coastal/mountain environment and that is exactly what happened to us. Under the obscuring cloud it got very dark. The air temperature distinctly dropped. The birds behaved as if night had come, and the strongest eclipse-induced wind I have ever experienced began. You could easily see the edge of the eclipse shadow on the distant mountains .. both coming and going. Then, about 2 minutes later, it was over! For those in our group who had never experienced totality the whole experience was still fascinating; however, for the experienced observers, it was disappointing. Paula was upbeat and, even though she has seen many total solar eclipses, she still enjoyed the experience But, I was less enthused.

When we returned to our hotel, we learned that the 20 degree, elevated, eastern horizon cloud, which had sent us driving up and over the Coastal mountains, had morphed into high cirrus accompanied by a mix of clear and cloudy patches. Those eclipse chasers who stayed on the beach in front of our hotel saw the eclipse through high cirrus clouds. Back at the resort, when Don received that news, he said " It was like a knife through my heart!" I guess that's what you say when you have an unbeaten record going into a game and then lose by a field goal.

News from other eclipse groups trickled in throughout the day. Charlie and Sheila Szabototh observed the eclipse through some high cirrus clouds; Dan and Donna Giesler, observing from their tour boat, managed to see the first Diamond Ring, but they missed the second Diamond Ring; Alan Dyer's group saw the eclipse through high cirrus clouds. Ralph Chou's Toronto Center Group, like us, was clouded out. Bob Berman's group, observing from our hotel beach, saw the eclipse through the cirrus clouds. Andreas Gada's group observed the eclipse through high cirrus clouds. Andreas described chasing this eclipse as a "crap shoot"... success depended on locations favored by chance.

As Bell's quote above says, "when one door closes, another opens". You see, Don still had magic up his sleeve. He treated us later to an astronomical home run and a game-winning, deep sky observing experience and for this, the weather cooperated! He had organized a special extension astronomy trip to the very dark skies of the Coonabarabran region. There, we visited two of the great observatories of Australia, and were treated to the most outstanding visual and telescope astronomy I've had in many years! That experience, in which 4 talented deep sky observers, all from the Three Rivers Foundation of Sydney, showcased, for our pleasure, the wonders of the fall and winter Southern Sky. They had travelled over 400 km to meet us and brought with them 5 large Dobsonians. Imagine, Eta Carina, the Homunculus, 47 Tucana, the Tarantula Nebula, seeing colour in the Orion Nebula, seeing the Horsehead with direct vision, the Moons of Neptune, the Helix, a supernova in the barred spiral, NGC 1365 ... well, the visual feast lasted all night. It more than made up for the cloud out!

I'll open that door in my January, 2013, FOV column.

Perseus (Per)

α Persei - Algenib (or Mirfak) β Persei -Algol
ξ Persei - Menkib ο Persei - Atik

Perseus can easily be identified; an imaginary line connecting Capella in Auriga and γ Andromedae passes about halfway between Algenib and Algol, the two brightest stars in this constellation. Note also the characteristic curve from η to λ Persei. One of the most interesting features of Perseus is the star Algol, the "Demon Star," an eclipsing variable. In only 4.5 hours, it wanes from magnitude 2.3 to 3.5. It remains at minimum for 20 minutes, then increases to its original brightness where it remains for 2 days, 20 h 48 min. The famous double cluster χ-h (NGC 869 and 884) is visible in fieldglasses; it is one of the most spectacular sights in the sky. There is a rich area for sweeping with binos near Algenib directly in the Milky Way.

DOUBLE STARS

	Mag.	Sep (s)	Location	Remarks
ε	3.0-8.3	9	035540	Green-Bluish White.
ζ	2.9-9.3	13	035232	
η	3.9-8.5	28	024756	Pale Yellow-Blue.
ο	3.9-8.5	1	034232	
Σ331	5.3-6.7	12	025852	
Σ369	6.5-7.8	3	031340	Yellow-Blue.
Σ533	6.0-7.5	20	042134	
Σ552	6.3-6.5	9	042840	Both White.

MESSIER OBJECTS

	Mag	Location	Remarks
M 34	5.5	023943	Open Cluster; beautiful; use low pow.
M 76	12.2	013951	Planetary Nebula.

Other Objects of Interest in Perseus

NGC 869 - Double Cluster; beautiful at low power Loc: 021657
NGC 884 Many beaut. contrasting stars in area. Loc: 022057

Other Objects of Interest in Cassiopeia

NGC 103 - Open Cluster. Designation 002161.
NGC 663 - A beaut. open cluster with many stars. Loc: 014161
NGC 7789 -Beaut. open cluster; lg cloud sm. stars. Loc:235456
γ–Cassiopeiae -Irregular variable, magnitude range 1.6-2.3.
R Cassiopeiae -Long per (431 d) var, max. mag. 7.0. Loc:235351
T Cassiopeiae -Long per (445 d) var, max. mag. 7.8. Loc:002155
V Cassiopeiae -Long per (228 d) var, max. mag. 7.9. Loc:231059

In Cassiopeia, can be found **NGC 457,** the **ET Cluster.** Look for the star marked ϕ at the spot labeled "ET" on chart at right. This star is in the heart of the cluster and makes "ET" easy to locate. This cluster actually does look like a stick figure version of the famous character from the Steven Spielberg classic of the same name. I have never yet met a child or an adult who cannot see the resemblance. It is also called the Owl Cluster, a name that has not caught on. There are a number of other NGC clusters nearby that could easily be called ET's "family". It turns out that ϕ–Cas is a nice double of 5th and 7th magnitude, coloured yellow and blue, that is easily separated in a telescope.

M103, near ET**,** is a nice open cluster as well. It is described by Kepple and Sanner in **Vol 1** of the **Night Sky Observer's Guide** as shaped like a Christmas tree. (The true Christmas Tree cluster is NGC 2264 which includes the Cone Nebula in Monoceros). So show off ET, the Christmas Tree and the Double Cluster -a triple treat!

Cassiopeia (Cas)

α-Coronae Borealis -Gemma β-Coronae Borealis - Nusakan

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 binos, especially around γ Cassiopeiae.

DOUBLE STARS

	Mag.	Sep (s)	Location	Remarks
α	2.5-9.0	64	003856	Yellow-Blue
η	3.5-7.3	11	004758	Yellow-Purp; easy in sm. scope
ι	4.7-7.0-8.2	2-7	022567	Yellow-Blue-Blue; 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

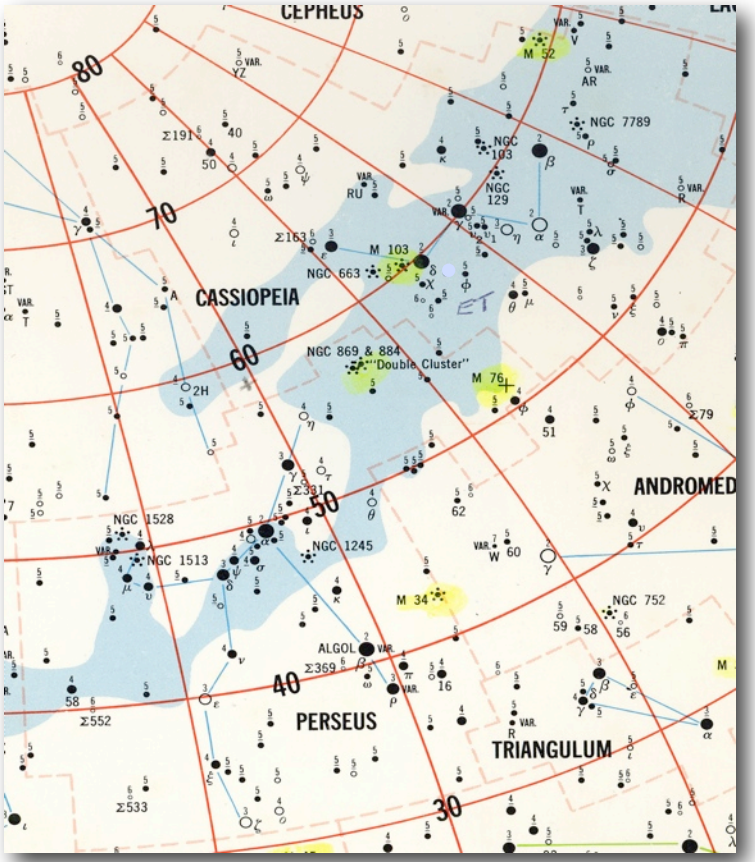


Chart Legend
- Star Location
- Double Stars
- \+ Nebulae
- ★ Clusters
- Variable Stars
Var

Star magnitudes are labeled as numerical values above (or near) the star. Underlined values are half magnitudes. Larger star dots denote brighter stars.

Dec 3 Jupiter at Opposition (mag -2.83)
Dec 4 Mercury at Greatest Elongation W: 20.6°
Dec 5 Last Quarter Moon rises at 11:44 pm EST
Dec 7 Jupiter 5° N of Aldebaran
Apollo 17 lift-off for Moon in 1972
Dec 9 Vesta at Opposition (mag 6.4)
Spica 0.8° N of Moon
Dec 10 Saturn 4° N of Moon
Dec 11 Venus 1.6° N of Moon
Mercury 1.1° N of Moon (See Special Events below)
Dec 13 New Moon rises at 12:14 pm EST
Geminid Meteors peak (120/h) New Moon!
Dec 14 Schmitt, Cernan, last Apollo astronauts leave Moon
Dec 15 Mars 6° S of Moon
Dec 17 Mercury 6° N of Antares
Dec 18 Ceres at Opposition (mag 6.7)
Dec 20 First Quarter Moon rises at 12:14 pm EST
Dec 21 Winter Solstice 6:12 EST
Dec 22 Ursid Meteor peak (10/h) Moon 70%
Dec 23 Venus 6° N of Antares
Dec 25 Jupiter 0.4° N of Moon
Dec 28 Full Moon (Moon Before Yule) rises 4:34 pm EST

BAS Events

Dec 5 BAS Meeting Grey Roots 7:00 pm
Speaker: John Hlynialuk "Christmas Star"
Dec 13 BAS Viewing Geminid Meteors (120/h) @dark
ES Fox Observatory
No further meetings until March 6, 2013. Have a happy holiday with clear skies until we meet again!

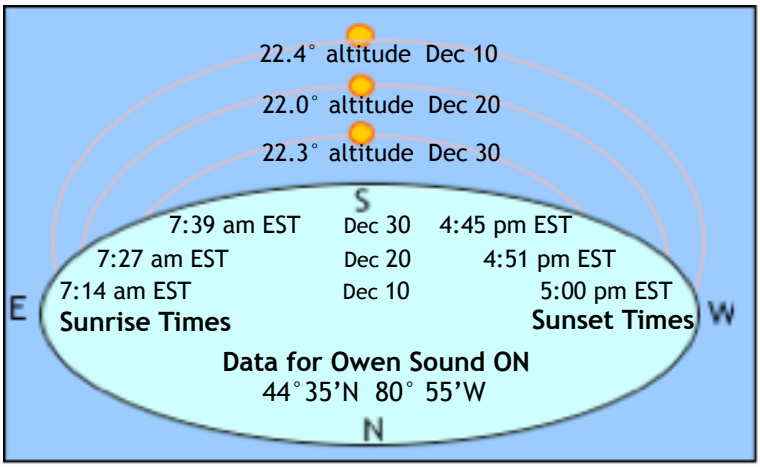
Special Events

Dec 11 Planet Grouping

Planets

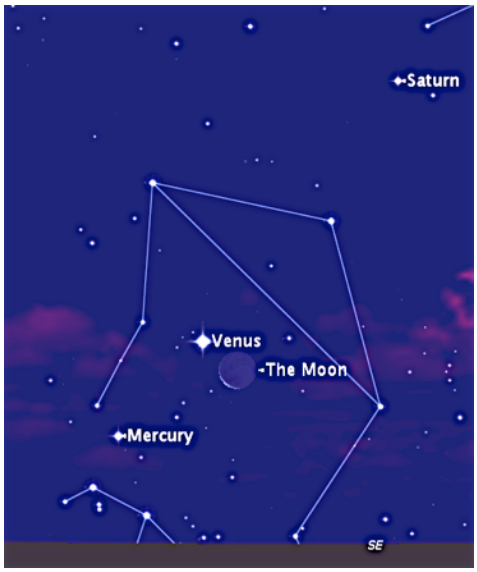
MERCURY, is visible in the morning sky and spends most of December backing towards the Sun where it is lost in its glare at month end. **VENUS**, (-4.0) is a dawn planet in December and passes through Libra, chasing Mercury towards the Sun. **Saturn, Venus and Mercury** are nicely spaced on Dec 3 in the dawn sky. **MARS** (1.2), moves eastward and stays above the western horizon in Sagittarius but it sets in early evening. **JUPITER**, (-2.7) reaches opposition in early December and is well up at dark between the horns of Taurus. A gibbous moon is less than a degree away on Dec 25. **SATURN**, (mag 0.65), is located in Virgo this month rising 2 hours before Venus appears. There is a nice grouping of Saturn, the crescent moon and Venus on Dec 10 to 12. Ring tilt for Saturn is 19° by the start of 2013. **URANUS**, (5.7) and **NEPTUNE**, (7.8) are well up by dark and set before midnight by the end of December. Finder charts are available on S&T website in their Observing section. Finder charts for two asteroids, **Vesta (8.2)** and **Ceres (9.0)** are also found on the S&T website. Vesta is below the left horn of Taurus and Ceres is near M35 in Gemini. **PLUTO** (mag. 14) is too close to the sun for viewing in December.

The diagram below gives the sunrise/sunset times and the sun's altitude on three dates this month. The sun continues to sink until solstice Dec 21 and then starts to rise. The moon calendar below shows lunar phases for the month. Times of moonrise for NM, FQ, FM and LQ are in the Sky Calendar listing at left. Note that the Winter Solstice occurs on Dec 21 at 6:12 EST.



Dec 2012

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	By permission University of Texas McDonald Observatory					1
2	3	4	5	6 LQ	7	8
9	10	11	12	13 NM	14	15
16	17	18	19 FQ	20	21	22
23	24	25	26	27	28 FM	29
30	31					



Saturn, the last crescent moon, Venus and Mercury make a nice group in the morning sky on Dec 10 (moon nearest Saturn) and Dec 11 (moon nearest Venus -see chart at left). Earlier in the month, around Dec 3, Spica, Saturn, Venus and Mercury are nicely lined up in the dawn sky -look 6:00 or 6:15 am or so, before dawn in the east. This month may be the last good look at Venus in dark sky as it is rapidly moving towards the sun. By the end of February, it is in the process of passing behind the sun reaching superior conjunction on Mar 28, 2013. You will have to wait until summer 2013 before it again becomes easily visible as an Evening Star in the western sky.

BAS Member Loaner Scopes

BOTH 12-inch Dobs now available.

BOTH 12-inch telescopes are now available for the winter, and we have at least one **8-inch dobsonian** for free member loan. Contact Brett T. or John H. if you are interested.

Scopes come in and out periodically so keep checking with Brett or John if you are interested in a loaner.

SGN Classified Ads Section

FOR SALE: Canon EOS 50D DSLR (body only)

15.1 Mp Excellent noise reduction features for night photos.

Asking $ 600. John H. 519 371-0670 stargazer@wightman.ca

Information about the 50D can be found here:
http://en.wikipedia.org/wiki/Canon_EOS_50D
and here:
http://www.imaging-resource.com/PRODS/E50D/E50DA.HTM

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

FREE STUFF:

Andreas Gada has donated back issues of **Sky & Telescope and Astronomy magazines**
These are free to pick up at the ES Fox Observatory
Next time you are there, HELP YOURSELF !

MORE FREE STUFF:

We are accumulating several small refractors and other equipment that we cannot use.

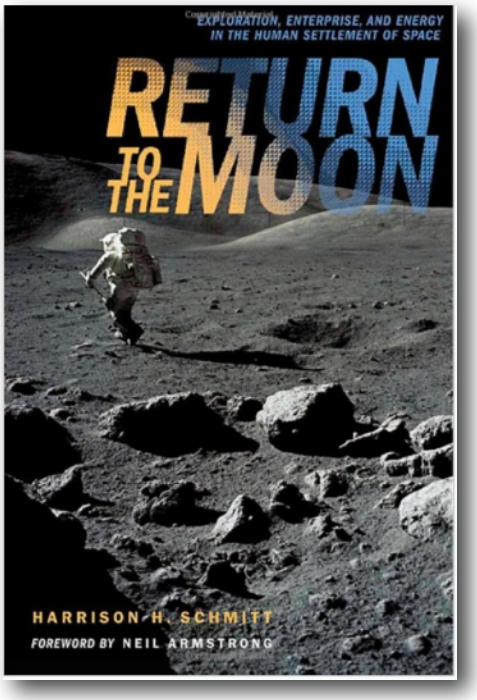
Check out the FREEBIE SCOPE BIN at the ES Fox Observatory
Next time you are there, HELP YOURSELF !

In past years, during the Harvest Dinner, tours of the observatory were offered. Most times, the cool, cloudy weather discouraged folks from making the effort to walk down the path to "the Fox". This time around, the offer was not made, but it was a pity. The full moon was bright and the skies were clear! Here the Big Dipper and Polaris show up clearly behind the BOEC communications tower. Photo by John H, Canon 50D, ISO 2000, 4 s, f3.5,15 mm focal length.

For Sale: HUTECH part # 3101 Single Arm Compact Fork Mount Head,

Sold !

There have been many books written about the future lunar exploration and the long-term benefits to the Moon's and Earth's occupants of doing so. Only one book, however, has been written by a man who has actually been to the Moon, explored its surface, and knows firsthand the economic benefits locked in the Moon's regolith. Harrison Schmitt's *Return to the Moon* will serve as a blueprint for how to achieve this and contribute to making the Vision for Space Exploration a reality. Anthony Young, The Space Review, January 3, 2006 "Astronaut geologist Harrison Schmitt outlines his vision of a Return to the Moon, and the mining of helium 3 to provide a future energy source for the earth. … The result is an erudite and persuasive thesis … .



This is an important book and one that really should be read … . The book is well written, challenging and prescient." (Michael Condry, Spaceflight, Vol. 49, January, 2007) "The author has unique qualifications for writing this exposition. Schmitt was the only scientist among 12 astronauts to visit the Moon … . There are … excellent diagrams and pictures from the author's own Apollo 17 mission. Springer is becoming a major publisher of space books for professionals, especially through its Copernicus and Praxis affiliations, who were responsible for this stimulating volume." (Philip R. Harris, Space Policy, Vol. 23 (2), 2007) "Former NASA Astronaut Harrison Schmitt … presents a compelling case for returning man to the moon. … This bold book is detail oriented and describes how Schmitt would reinvigorate the U.S. space program through a public-private partnership to mine helium-3 on the moon for generating inexpensive fusion power on Earth. Dr. Schmitt, a geologist, astronaut, U.S. Senator, businessman, and teacher, uses his years of experience and knowledge to carefully craft a program to put man back into deep space for the long term." (K. Eric Livo, Economic Geology, Vol. 101, 2006)

About the Author

Harrison Schmitt is, as of this date, the 12th and last human to have stepped on the Moon. As an astronaut, pilot, geologist, academic, businessman, and United States Senator, he has had a distinguished career in science and technology practice and policy. Schmitt was the first scientist to go into space specifically to explore the Moon as the Lunar Module Pilot and field geologist on the last Lunar Mission, Apollo 17. He is active in private and government sponsored research into a return to the Moon, and in fusion technologies at the University of Wisconsin-Madison, where he is Adjunct Professor of Engineering. In his role as a Senator (R-NM, 1977-1983) he was chairman of the Commerce Committee's Subcommittee on Science, Technology, and Space.

Training in the Footsteps of Apollo

NLSI, (NASA Lunar Science Institute) with the Lunar and Planetary Institute's Center for Lunar Science and Exploration [CLSE] and its international partner– the **Canadian Lunar Research Network**– organized a Field School at the Sudbury Impact Structure as a week long classroom and field training program based in Sudbury, Ontario, on October 1-5, 2012.

The program followed the immersive training and education given to Apollo astronauts to introduce students to impact cratering processes and observe, in the field, the attributes of an immense impact basin.

Skills developed prepare students for thesis studies in impact cratered terrains, whether they be on Earth, the Moon, Mars, or some other solar system planetary surface.

This field training will lead to further collaborative work between US and Canadian scientists that will greatly enhance the productivity of our lunar science and exploration programs.

Above: *Students examine the Onaping breccia that was produced by the Sudbury impact event 1.85 billion years ago (also studied by Apollo astronauts in the latter stages of Apollo . The immense Sudbury Igneous Complex was the central impact melt pool produced by that impact event.* ***Credit: Kring/LPI***

RIght *Apollo 16 geologic training-exercises in Sudbury, Ontario, Canada July 7-9 1971; Charles Duke (left) and John Young studying traverse map prepared for them during geologic traverses at Sudbury. Both astronauts have electric Hasselblad cameras, similar to the ones they would use on the Moon, mounted on their chest plates.* ***Credit: NASA***

Solar wind most likely source of water on the Moon

Oct 17, 2012 from physicsworld.com by Tushna Commissariat

Scientists in the US claim that water on the Moon's surface could have originated from the solar wind. Their experiments on lunar samples reveal the presence of significant amounts of hydroxyl inside glasses formed in the lunar regolith by micrometeorite impacts.

Although the possibility of water existing on the Moon has been debated since the 1970s, it was only in 2008 that the exact amount of water was confirmed thanks to technological developments. In 2009 and 2010, NASA's Lunar Crater Observation and Sensing satellite (LCROSS) detected water in the lunar regolith. But to help answer the question of how that water got there, researchers considered the solar wind, a comet striking the lunar surface or volcanic degassing. Although lab simulations of solar-wind bombardment successfully produced hydroxyl compounds – which consist of one atom of hydrogen and one of oxygen – in lunar soils, the exact origin and storage of hydrogen in lunar soils remained unknown.

Looking at grains

In this new work, however, lead author Yang Liu of the University of Tennessee, along with colleagues of the University of Michigan and the California Institute of Technology, have measured hydroxyl in soil grains in Apollo samples. They then used the techniques of Fourier transform infrared spectroscopy and secondary-ion mass spectrometry to determine the chemical form of the hydrogen in a substance, as well as its abundance and its isotopic composition.

"With the infrared spectroscopy, conducted in the Youxue Zhang's lab at the University Michigan, we can tell the form of 'water' – whether it is OH, H_2O or CH," explains Lui. With the secondary ion-mass spectrometry, conducted at Caltech, the team measured the amount of hydrogen and its chemical make-up. "We found that the 'water' component – the hydroxyl – in the lunar regolith is mostly from solar-wind implantation of protons, which locally combined with oxygen to form hydroxyls that moved into the interior of glasses by impact melting," says Zhang.

Tracing the origins

The solar wind is a constant flow of charged particles from the sun and Liu says that its energy is enough to damage the surface of a grain but is low enough to be embedded and [bind] with oxygen on the surface. "During later impact melting of lunar soils, some of the hydrogen was transferred and stored in the glass formed by the impacts," she says. Liu adds that without the protection of an atmosphere or a permanent magnetic field, solar wind has bombarded the surface of the Moon and other airless bodies for billions of years, delivering the necessary ingredient for making the hydroxyl.

"All previous studies of lunar samples were not able to determine the chemical form of hydrogen, but now, we have determined that the hydrogen in lunar soils exists as hydroxyl in the glass," says Lui. Because of a combination of lab-based simulation and remote sensing, the team believes that it has robust evidence for solar-wind origin for some of the lunar surface water. For lunar polar ice, Liu's finding suggests a possible source from solar wind in addition to comet impacts. "Lunar regolith is everywhere on the lunar surface, and glasses make up about half of lunar regolith," she says.

Above: *Apollo 17 "orange soil" on the lip of Shorty Crater. Micro-photo right reveals the secret: orange glass beads and fragments from a volcanic "fire fountain." These fragments have accumulated traces of hydroxyl ions from the solar wind -one component of the water molecule.*

$25,000 per pint

The researchers also point out that their findings show that there is a volumetrically large reservoir for water available on the Moon and that it is a valuable resource. "With the cost of $25,000 for taking one pint of water to the Moon, it is essential that we develop processes of producing water from the materials on the Moon. This is paramount to human settlement of the Moon in the near future," says Lui.

This water would be of most value as rocket fuel – in the form of liquid hydrogen and liquid oxygen – she explains, adding that it has been suggested by others that water ice from the lunar North Pole alone could be converted to fuels equivalent to a space-shuttle launch every day for 2200 years. "Now we have ready sources of water that can be consumed by plants and humans but also dissociated into its constituent elements – O_2 and H_2. Thus, the Moon is a good candidate as a jump board for missions to Mars and beyond." In the future, the researchers are keen to examine more lunar samples to come up with a good estimate of the "water budget" on the Moon.

The work was published in Nature Geoscience.