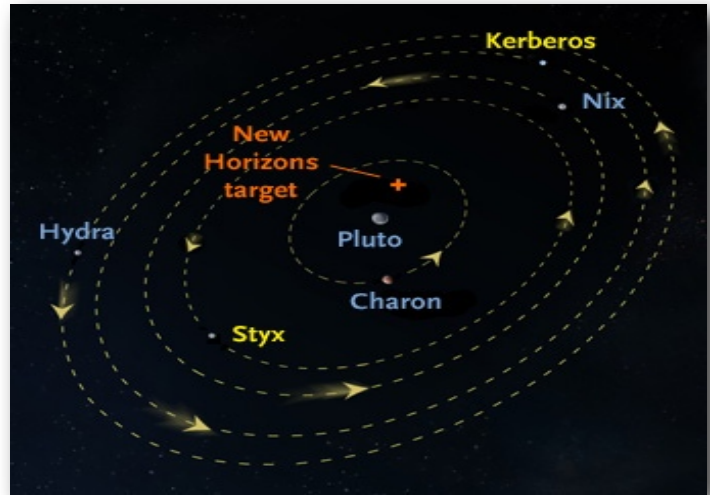




*Astronomy News for Bluewater Stargazers*  
*Vol 7 No. 7 Aug 2013*

**Aug 2013 Contents**

- p 1: Pluto's new moons named; BAS at Dark Sky Weekend
- p 2: BAS Events; From the "Top" column returns in Sep
- p 3: BOEC makes 12 Best Stargazing Locations List
- p 4: Summer Aurora Shine
- p 5: Radar Views of 1998 QE2 Asteroid and its Moon
- p 6: Sounds from Aurora?
- p 7: Quetican FoV: Lunar Crater Petavius
- p 8: Cassini Images Earth through Rings
- p 10: Finder Charts for Pluto and Juno
- p 10: Refined Distances to M31 and M32
- p 11: Constellations: Ophiuchus & Serpens (Head & Tail)
- p 12: Sky Calendar: Perseid Meteors in Prime Time
- p 13: Classified Ads; Miscellaneous, Limitless CD



**Say Hello to Kerberos and Styx**

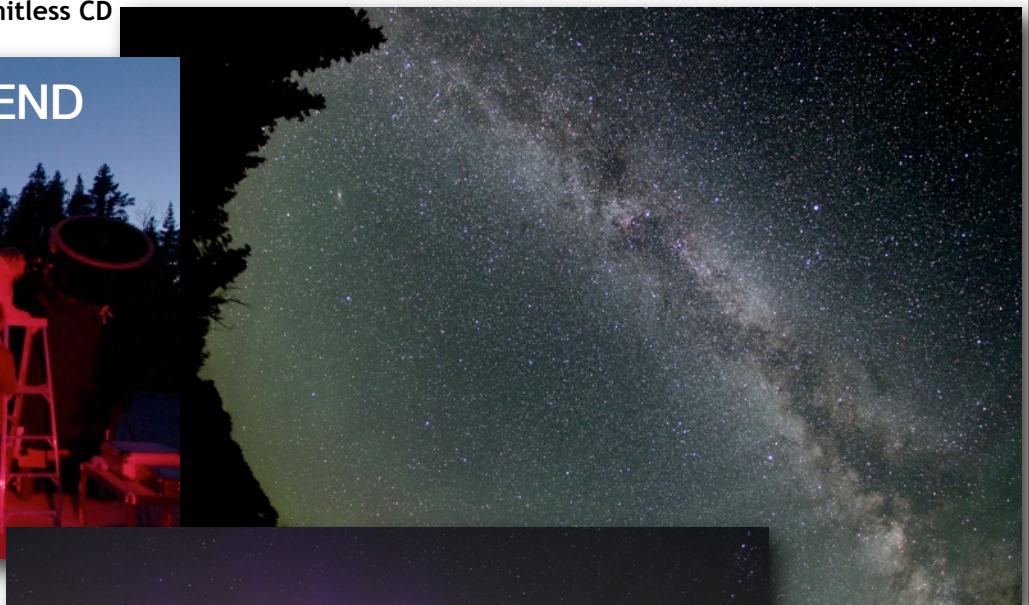
These two moonlets were spotted in sequences of Hubble images, and for a while were nicknamed simply "P4" and "P5". (The International Astronomical Union, it should be noted, created the official designations S/2011 (134340) 1 and S/2012 (134340) - yecch! -ed). In Greek mythology, Styx is the river (and the goddess thereof) that separates Earth from the underworld. Kerberos is the three-headed guard dog who prevents the dead from escaping the underworld. The IAU picked this spelling over the variant Cerberus, which is already used for an asteroid. **Actually, the top vote-getter was Vulcan.** After all, that's the Roman god of volcanoes (a little-known fact), and Vulcan was the home planet of Mr. Spock in Star Trek (a better-known fact). But it's also been used for many decades in astronomical mythology, for a planet purported to circle the Sun well inside Mercury's orbit.



**DARK SKY WEEKEND**  
**Best Ever!**

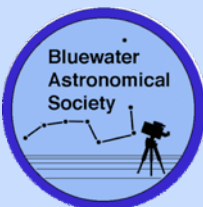
**July 13, 2013: BAS at BPNP**

BAS members provided stargazing for campers at the Cyprus Lake Campground during Dark Sky Weekend July 12-14. Both nights being clear allowed for spectacular stargazing (8 telescopes including Webster!) and a variety of astronomy info from our "public outreach team". The icing on the cake was a nice auroral display at 2 am Saturday night over Horse Lake. As expected, Webster proved to be a popular telescope with lineups 15 deep at times. (Image above c/o John H.) We had visitors from Canada, Holland, and Bulgaria, among other locations. Image right (Aaron T.) shows the 2 am aurora as well as Capella reflected in the water!



The forte of a Dark Sky Preserve is dark sky. The 3 min single MW image above from Sag to Cas shows the power of the Canon 60Da. Note the Northern Coal Sack (the dark cloud above Deneb) and M31 in the greenish airglow to the left of the MW. The Summer Triangle is centered. (John H image.)

**Disclaimer:** StarGazer News reports the activities of the Bluewater Astronomical Society (formerly Bruce County Astronomical Society) but any opinions presented herein are not necessarily endorsed by BAS. See the BAS website at [www.bluewaterastronomy.info](http://www.bluewaterastronomy.info) for up-to-date details relating to BAS events. The BAS "blog" is temporarily not available. StarGazer News is produced and edited by John Hlynialuk. I am solely responsible for its content. Your opinions, comments, observing reports, etc., are welcome. I reserve the right to edit for brevity or clarity. Errors or omissions are entirely mine although I strive for accuracy in star events, etc. I will not publish your emails or other materials without your specific permission to do so. No part of this publication Aug be reproduced in any form whatsoever without the editor's consent. However, the Sky Calendar and Feature Constellation pages are free for you to copy. Feel free to forward this issue in its entirety to your friends. Email comments or submissions to [stargazer@wightman.ca](mailto:stargazer@wightman.ca)



## BAS Executive 2013-2015

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



## BAS Events for August 2013

- Jul 30 Tues Summer Stargazing-1** ES Fox 7:30 pm talk, star tour follows weather permitting. Bring bug spray. Dress warmly! **Fees:** \$10/adult, kids under 18 free (proceeds support astronomy education)
- Aug 3 Sat BAS viewing @Fox@dark**, backup Aug 31 (last cres)
- Aug 6 Tue Summer Stargazing-2** ES Fox 7:30 pm talk, star tour follows weather permitting. See note for July 30 above.
- Aug 7 Wed NO BAS meeting**
- Aug 8-11 Starfest** <http://www.nyaa.ca/>
- Aug 11/12/13 PERSEIDS** 90/h ES Fox @dark, Moon sets 11 pm
- Aug 16 Fri Public viewing** Grey Roots Mus. 9 pm, backup Aug 17 (Members required with scopes) FQ moon
- Aug 13 Tue Summer Stargazing-3** ES Fox 7:30 pm talk, star tour follows at Fox. See note for July 30 above. (NM)
- Aug 20 Tue Summer Stargazing-4** ES Fox 7:30 pm talk, followed by star tour at Fox. See note for July 30 above. (FM)
- Aug 24 Sat MacGregor Park** star talk/tour 8 pm, BAS members with scopes appreciated
- Aug 27 Tue Summer Stargazing-5** ES Fox 7:30 pm talk, followed by star tour at Fox. See note for July 30 above. (LQ-1)

## New 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
- Welcome to the new members on exec and  
**Thank You** to those who served in the past!

## Astronomy Kids' Day Camp Cancelled for 2013

Due to low registration, the Astronomy Kids' Day Camp has been cancelled. Summer day camps in the area are experiencing low numbers this year for reasons that can only be guessed at. It could be just a general decline in school age children or economic conditions or perhaps too many day camp offerings this summer. We will try again next year. Dates are tentatively set for July 28 to Aug 1.

## From the "Top" column by Aaron Top Pres BAS

Wow what a week! I don't even know where to begin, 10 days of clear sky and only one cloudy night! This was by far if not some of the best skies I have ever seen!! I can't even believe how fast these 11 days have just flown by... I guess that's what happens when you are having fun. I had the opportunity to meet and greet some awesome people along with spectacular viewing. My passion and ambition has again taught me more about myself, the sky and others. Experience gained. But most importantly the fun in all this awesome stuff I and the BAS along with others do. I often feel pressured to have to do well and it is difficult. I try to keep the "FUN" in whatever I do and although I may not be able to do everything right I am thankful for those I have to back me up! The BAS, John, Brett, Lorraine and Greg, Cheryl, Murray and Cory along with everyone else. I am thankful you are all there to back me up and to offer your ideas, advice and help etc. without you I would be lost. To my family and friends as well! Your support is inspiring. Just a quick shout out to a few random friends I have made on my journey, Alex Roman, Jeffrey Deans, Rita Gordon, Paul Beduhn, Mike Halliday and Kevin Chiasson thank you all for making my adventures that much more interesting. Cheers to forever staring up at the sky!

BTW the BAS BPNP Dark Sky Weekend, went without a hitch. The sky was pristine and the Milky Way looked as if it were painted in the sky, the patches of dark nebula (the horse) just seemed to pop right out at me. Along with seeing auroras (I saw them 3 times in 11 days) down at Horse Lake with my fellow observers.

Aaron

## Chris Hadfield to speak at OSCVI Sep 28

Retired Canadian astronaut Chris Hadfield is due to speak in Owen Sound (OSCVI auditorium) on Sep 28 at 7 pm. The Meaford Hospital Fundraising Committee managed to snag the former Canadian astronaut as part of their fundraising efforts. Tickets are available at the Roxy box office in Owen Sound or at the Roxy website [www.roxytheatre.ca/](http://www.roxytheatre.ca/) Cost is \$100 with \$40 tax receipt.

## Venue for Summer Stargazing Sessions changed:

The location of our Summer Stargazing Sessions has been changed. The entire program will be held at the Fox Observatory this year as opposed to starting out at the Learning Centre and then moving to the Fox for observing afterwards. It is easier on our volunteers to consolidate the event at one building rather than moving between the two.

## The 12 Best Places to Stargaze

With the clearest night skies in the world, these locations provide an incredible celestial view. [BOEC is #12 of 12!] [Click here](#)

by Megan Taylor Morrison Jun 21, 2013 @ 1:21 PM [www.theactivetimes.com](http://www.theactivetimes.com)

On January 17, 1994, a magnitude 6.7 earthquake struck Los Angeles, leaving 680,000 of the city's residents without power. That night, reports of a "giant, silvery cloud" in the sky poured in to emergency centers across the city. The sight that alarmed so many people was actually the Milky Way, unveiled from behind the city's powerful glow.

As populations and urban centers continue to boom, so does the light pollution that blocks the night sky and its celestial bodies. Two-thirds of the U.S. population and more than one-half of the European population can no longer see the Milky Way with the naked eye, according to *The First World Atlas of the Artificial Night Sky Brightness*. In addition, 63 percent of the world population and 99 percent of Americans (in the contiguous U.S.) and Europeans live where light pollution is greater than the threshold set by the International Astronomical Union.

Luckily, clear skies are still available for anyone who wants to experience them. Found across the world, the destinations in our slideshow are recognized as some of the best spots to see stars, constellations, galaxies and more.

To choose the featured locations, we used several methods. The first was each site's rankings on the nine-level Bortle Scale. The Bortle Scale was created by John E. Bortle and introduced in the February

2001 edition of *Sky & Telescope* magazine to help amateur astronomers compare the darkness of observation sites. It measures stars' brightness, as well as any interference from light pollution and sky glow. The darkest skies on earth fall into Class 1, while the brightest skies—such as those in the inner-city—are in Class 9. For this list, we used only skies that fall into Class 1-3.

We also looked to dark-sky preserves. The majority of the best-rated preserves are in Canada, and for good reason. Based on the work of the Royal Astronomical Society of Canada, the Canadian government established extensive standards for these areas. Outside of Canada, designations are generally self-proclaimed and can therefore result in mislabeling.

Other selections came from the collection of Certified International Dark Sky Parks. These areas "possess exceptional starry skies and natural nocturnal habitat where light pollution is mitigated and natural darkness is an important educational, cultural, scenic, and natural resource," according to the International Dark Sky Association. We chose areas with the highest award: the gold designation. Criteria for this designation include a Bortle Sky Class of 1-3 and a full array of visible sky phenomena from auroras to the Milky Way.

Finally, we also added a few spots used by top astronomers for research. These places are home to international observatories and attract scientists from across the globe.

Ready to see the list? [Click here to see all 12.](#)

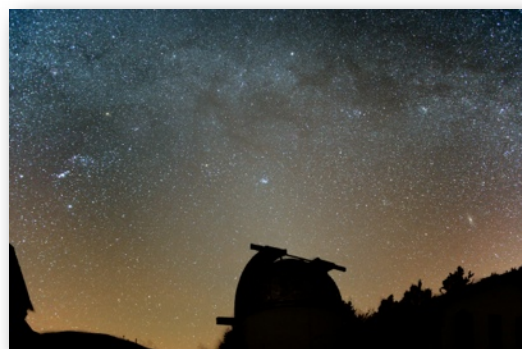
[Five of the 12 are shown at right. BOEC Dark Sky Preserve is also in the list. We appear to be in some VERY good company! -ed]



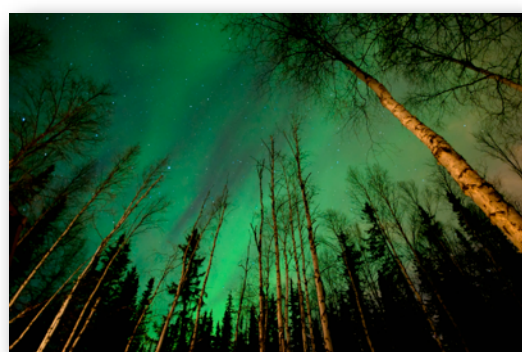
Mauna Kea—Hawaii, USA



Natural Bridges Nat. Mon.—Utah, USA



Poloniny Dark-Sky Park—Slovakia



Kejimikujik National Park—Nova Scotia



Cerro Armazones—Chilean Andes

### HELP! HELP!! HELP!!! HELP!!!!

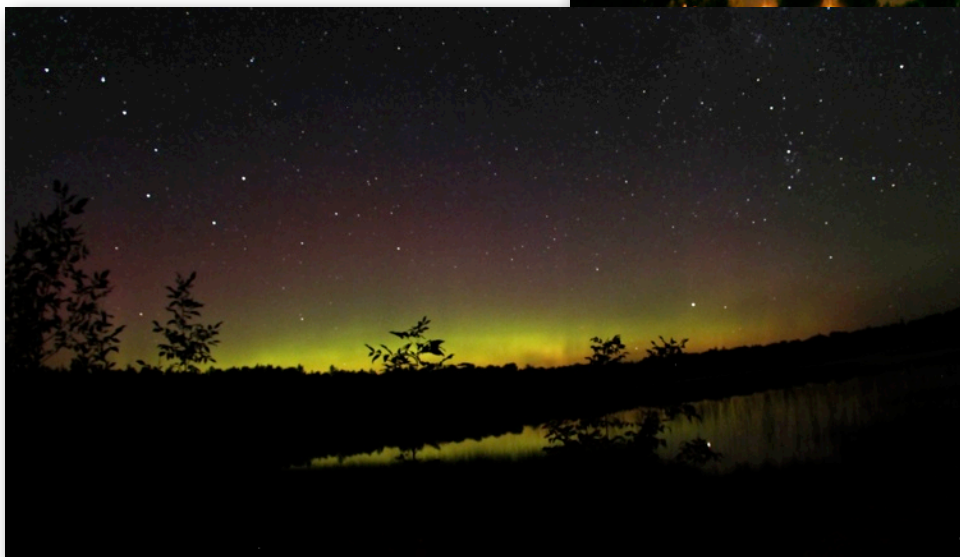
A big part of what BAS does is public outreach. There are several events coming up along those lines soon that require help from BAS members. **The Summer Stargazing Sessions July 30, Aug 6, 13, 20 and 27** require two or three additional members (Joan and John plus ???) to man the telescopes at the Fox Observatory on clear Tuesday nights. Please let them know if you can help out with any of those. **Public viewing at Grey Roots (Aug 16, Sep 6)** is more successful if a number of different telescopes are set up. And the **Aug 24 session at MacGregor Park** has become an annual event which is also more interesting if a variety of telescopes are available. So, if you can assist on any of those nights, even if only on one or two, PLEASE let Joan or John know so we can plan our program accordingly. Is it too trite to say that if everyone pitches in on one or two events, then the work is easier for everyone? Thanks in advance for any **HELP** you can provide! The public face of BAS depends on you.

## Summer aurora light up North America

BAS members (and contacts outside of the Bluewater area) were treated to northern lights displays on several occasions in June and early July. Displays were recorded by local astrophotographers on June 1, then again on July 11 (both early morning events). Then a few days before the Dark Sky Weekend at the national park, a weak disturbance produced surprising long-lived aurora over the next few nights. Even Sunday night, July 14, had some activity.

These events also were recorded by our "far-flung network" of contacts including Chris H. from Saskatoon who sent the two images at right. Taken with a Canon 20D set at ISO 1600, 8-10 second exposures, the images were processed slightly to remove the reddish cast produced by city lights. Chris was shooting from the Wildwood Golf Course just east of his apartment block. The star background is Andromeda and Pegasus and M31 is just visible through the glow. Chris took these after spending a night at the U of Sask observatory observing Saturn, Mizar and Alcor and  $\epsilon$ -Lyrae (the Double-Double).

The image below was taken early Sunday morning overlooking Horse Lake in the BPNP. That display is also pictured on page 1. A location overlooking a lake is perfect for catching the reflection of stars and aurora and turns a nice aurora image into a better-than-average aurora image. The bright star reflected in the lake is Capella which surprisingly is circumpolar (by 1°) at our latitude. The Big Dipper is easy to pick out upper left and Perseus is at upper right. The variable star Algol is easily visible in the top right corner. The faint constellation between Perseus and the Dipper bowl is the less-known Camelopardalis. A few stars in the head of the Lynx are present as well.



Aaron T. image (right) of the same aurora also caught two amorous male (probably) fireflies signalling to the females hiding in the shrubbery around Horse Lake. This genus is probably Photuris based on the type of light given off and the duration of the flash.

## Arecibo Radar Sees Asteroid 1998 QE2 and its Moon

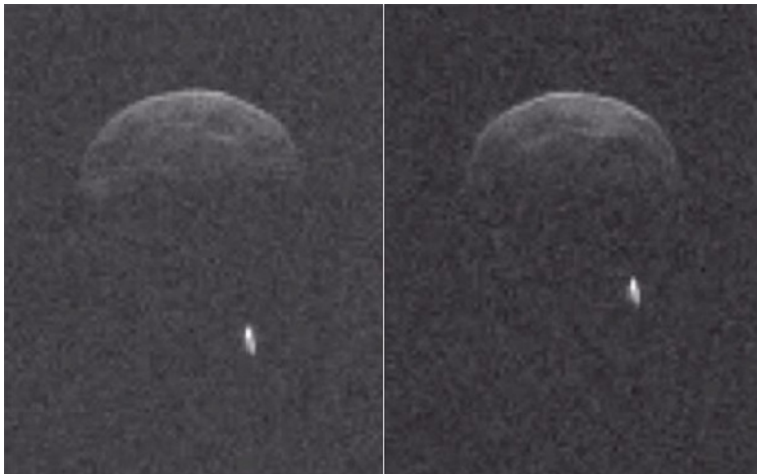
June 14, 2013 Contact: [Alessandra Springmann](#)

**Arecibo, Puerto Rico, June 14, 2013** - Arecibo Observatory catches the most detailed radar images ever of asteroid 1998 QE2 and its newly discovered moon as they safely pass our planet.

Arecibo Observatory continues to take radar images of asteroid 1998 QE2 and its moon as the space rock sails safely passed earth this week. The images show a dark cratered asteroid 3 kilometers across (1.9 miles) with a companion moon 750 meters (2,500 feet) in size. The asteroid and its moon passed 6 million kilometers (3.75 million miles) from earth, far enough from our planet not to worry, close enough to study this rocky world with the most sensitive radar telescope in the world, the U.S. National Science Foundation's Arecibo Observatory in Puerto Rico. "Asteroid QE2 has no chance of hitting earth," said USRA's Dr. Michael Nolan, head of the asteroid radar group at Arecibo Observatory who took the images.

asteroids," said Nolan. "Arecibo is a thousand times more powerful than your microwave oven." Sensitive radio receivers collect radio signals reflected from the asteroids and computers turn the radio echoes into images that show features such as craters and the smaller moon. The moon appears brighter than the asteroid as it is rotating more slowly; thus, its Doppler echoes compress along the Doppler axis of the image and appear stronger.

**Of the asteroids that come close to Earth, approximately one out of six have moons.**



**Images above:** Radar images of Asteroid 1998 QE2 taken in the first week of June, 2013 as the asteroid and its moon safely passed Earth. The asteroid appears lit from the top. The "light" is from the powerful radio waves from the radar transmitter. Several craters are visible on the asteroid, and the moon appears as a bright streak. [This image underplays the size relation between the two objects. The moon is about 1/4 the size of the primary! -ed] **Image credit:** Arecibo Observatory/NASA/Ellen Howell

Arecibo Observatory and the complementary Goldstone Solar System Radar in California run by NASA's Jet Propulsion Laboratory are unique among telescopes on earth for their ability to resolve features on asteroids, when optical telescopes on the ground would see these rocks as simple points of light. "We transmit powerful radio waves at passing

Dr. Patrick Taylor, a USRA research astronomer at Arecibo, remarked that "QE2's moon is roughly one-quarter the size of the main asteroid," which is a lumpy, battered world in the inner part of our solar system. "Similarly, our moon is also approximately one-fourth the size of our planet."

QE2's moon will help scientists determine the mass of the main asteroid and what minerals make up the asteroid-moon system. "Being able to determine its mass from the moon helps us understand better the asteroid's material," said Dr. Ellen Howell, a USRA research astronomer at Arecibo Observatory who took both radar images of the asteroid at Arecibo and optical and infrared images using the Infrared Telescope Facility in Hawaii. While the optical images do not show detail of the asteroid's surface, like the radar images do, instead they allow for measurements of what it is made of. Howell said, "What makes this asteroid so interesting, aside from being an excellent target for radar imaging, is the color and small moon."

"Asteroid QE2 is dark, red, and primitive - that is, it hasn't been heated or melted as

much as other asteroids," continued Howell. "QE2 is nothing like any asteroid we've visited with a spacecraft, or plan to, or that we have meteorites from. It's an entirely new beast in the menagerie of asteroids near Earth."

The provisional designation "1998 QE2" reflects the mid-August 1998 discovery date of this asteroid and is not related to the Queen Elizabeth II ocean liner, though a similarity of the asteroid's name to that of a cruise ship makes for interesting size comparisons. Arecibo astronomer Rhys Taylor said, "The moon is twice the length of the Queen Elizabeth II ocean liner, while the asteroid is nine times the length. Twenty-nine QE2 ships would fit around the circumference of asteroid QE2, plus or minus a ship."

USRA's Michael Nolan led the radar observations of QE2, with Ellen Howell, Patrick Taylor, Alessandra Springmann, Sean Marshall of Cornell University, and Mariah Law of Embry-Riddle Aeronautical University, in collaboration with the Near-Earth Object radar team at NASA/JPL and Goldstone Observatory in California. Observations continued through the morning of June 13, 2013.

Located in Puerto Rico, the Arecibo Observatory is home to the world's largest and most sensitive single-dish radio telescope, and dedicates hundreds of hours a year of its telescope time to improving our knowledge of near-Earth asteroids.

For more images and information on asteroid 1998 QE2, see the Arecibo Observatory's planetary <http://www.naic.edu/~pradar/1998QE2/>

## Put The Aurora Borealis In Your Ear

by BOB KING, MAY 20, 2013 UNIVERSE TODAY

Do the aurorae makes sounds? That's been a subject of discussion — and contention — among people who watch the sky. While most of us will never hear the aurora borealis directly, there's help out there in the form of a little handheld radio. It's called a VLF receiver and guarantees you an earful the next time the aurora erupts.

Despite seeing hundreds of northern light displays ranging from mild to wild, I've yet to actually *hear* what some describe as crackles and hissing noises. There is some evidence that electrophonic transduction can convert otherwise very low frequency (VLF) radio waves given off by the aurora into sound waves through nearby conductors. Wire-framed eyeglasses, grass and even hair can act as transducers to convert radio energy into low-frequency electric currents that can vibrate an object into producing sound. Similar 'fizzing' sounds have been recorded by meteor watchers that may happen the same way.

Imagination may be another reason some folks people hear auroras. Things that move often make sounds. A spectacular display of moving lights overhead can trick your brain into serving up an appropriate soundtrack. Given that the aurora is never closer to the ground than 50 miles, the air is far too thin at this altitude to transmit any weak sound waves that might be produced down to your ears.

If you're like me and hard of auroral hearing, a small VLF (very low frequency) radio receiver will do the job nicely. This handheld device converts very low frequency radio waves produced from the interaction of the solar electrons and protons with the Earth's magnetic field into sounds you can listen to with a pair of headphones.

Radio waves given off by auroras and other forms of natural 'Earth energy' like lightning range from 19 to 1,800 miles long or longer. To bring them within range of human hearing we need a radio receiver. I fire up a little unit called a WR-3 I purchased back in the mid-1990s. The components are housed in a small metal box with a whip antenna and powered by a 9-volt battery. The on-off switch also controls the volume. Plug in a set of headphones and you're ready to listen. That's all there is to it.

The receiver picks up lots of things besides aurora including a big 'unnatural' hum from alternating or AC current in power lines and home appliances. Turn one on in your house and you'll immediately hear a loud, continuous buzz in the headphones. You'll need to be at least a quarter mile from any of those sources in order to hear the more subtle music of the planet.

I drive out to a open 'radio quiet' rural area, turn on the switch and raise the antenna to the sky. Don't stand under any trees either. They're great absorbers of the low frequency radio energy you're trying to detect. What will you hear?

\* [Sferics](#). -pops, crackles and sizzles of distant lightning like the crackles on an AM car radio during a thunderstorm.

\* [Tweeks](#). -lightning induced radio noise, -remind me of Star Wars lasers or dripping water. Flurries of tweeks have an almost musical quality like someone plucking the strings of a piano.

\* [Whistlers and Whistler Clusters](#). -lightning radio waves can cycle back and forth between the north and south geomagnetic poles with the higher frequency waves arriving before lower frequency causing the sound to spread out in a series of long, descending tones bombs whistling through the air. Tweeks are very brief; whistlers last anywhere from 1/2 to 4 seconds or longer.

\* [Dawn Chorus](#). -dozens of whistlers, one after the other, sound like frogs or a chorus of birds at dawn.

\* [More Dawn Chorus](#): On a good night, and especially when the northern lights are out, it's a magnetospheric symphony.

Thunderstorms thousands of miles away provide a bounty of crackles and tweeks with occasional whistlers. Listen closely and you might even hear the froggy voice of the aurora rising and falling with a rhythm reminiscent of breathing.

Basic receivers are available through the two online sites below and run between \$110-135. One word of warning if you purchase — don't use one when there's a lightning storm nearby. Holding a metal aerial under a thundercloud is not recommended!

\* [WR-3 VLF receiver from Stephen McGreevy](#)

\* [North Country Radio ELF Earth Receiver](#)

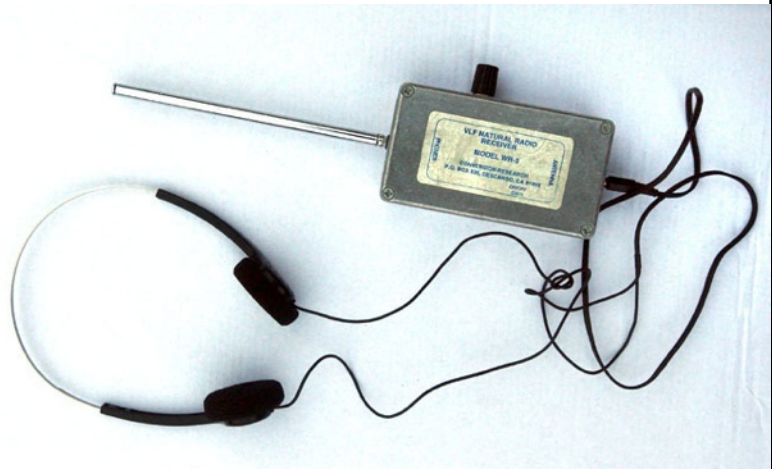
Things to keep in mind when considering a purchase are whether you have access to an open area 1/2 mile from a power line and away from homes. You'll also need patience. Many nights you'll only hear lightning crackles from distant storms thousands of miles away peppered by the occasional ping of a tweet. Whistlers may not appear for weeks at a time and then one night, you'll hear them by the hundreds. But if you regularly watch the sky, it's so easy to take the radio along and 'give a listen' for some of the most curious sounds you'll ever hear. How astonishing it is to sense our planet's magnetosphere through sound. Consider it one more way to be in touch with the home planet.

For more on natural radio including additional sound files I invite you to check out [Stephen P. McGreevy's site](#).

About Bob King

I'm a long-time amateur astronomer and member of the American Association of Variable Star Observers (AAVSO). My observing passions include comets, variable stars, deep sky, and photographing sky events like conjunctions and northern lights.

Read more: <http://www.universetoday.com/102234/put-the-aurora-borealis-in-your-ear/#ixzz2TVuS56cc>



The battery-operated WR-3 VLF (Very Low Frequency) receiver with headphones for turning natural radio broadcasts by planet Earth into audible sounds. **Credit:** Bob King

## Playing on the Shores of the Sea of Fertility

*"I was like a boy playing on the seashore,  
and diverting myself in now and then  
finding a smoother pebble,  
or a prettier shell than ordinary,  
whilst the great ocean of truth lay  
all undiscovered before me"*

Isaac Newton

The natural world has an infinite capability to surprise, enthuse, and inspire us with its variety of forms and their intrinsic beauty. It is no secret that perception is a two-way street in which the observer and the observed are connected with an intimate thread. But, for the Universe to work its magic on us, we have to be receptive. Isaac Newton knew this well and he captured that joy of discovery when a boy (himself) is "playing" on the "seashore" (nice metaphor) and diverts himself in finding a "prettier shell" than ordinary. Some of my most memorable astronomy observing experiences are of this type... unplanned, serendipitous experiences. When I least expect it, the cosmos reaches out and touches my soul. Let me explain with a recent example.

I have been testing a new piece of equipment for a New Jersey Company and, as with all new equipment, there are the obligatory software updates. A week ago, after

we had just returned from a visit with our family at their farm near Ilderton, ON, I went out to the observatory and finished installing the Company's updated software on my computer. It was now after midnight and the waning gibbous Moon, which was about 2 days past its Full Phase, had cleared the eastern wall of the roll-off roof observatory. The "seeing" was excellent and I decided to check out the lunar terminator with my TAK TOA 150 refractor. If your goal is to observe crisp detail on the Moon, then you usually direct your attention to lunar features that are near this boundary. It is called the terminator because that identifies the line where the visible sunlit portions of the moon terminate. But the terminator is a moving target and, if you are patient at the eyepiece, you can actually observe the slow movement of this separation line between light and dark. On this particular night the terminator crossed just near the edge of the Sea of Fertility (Mare Fecunditatis) and revealed spectacular detail in the adjacent craters. In fact, the terminator was just located beside Petavius, a 177 km diameter, floor-fractured crater. Even at low power, the view was stunning. Such detail, so sharp and crisp!

Listen to the words of Rev. R.T Webb as he describes Petavius:

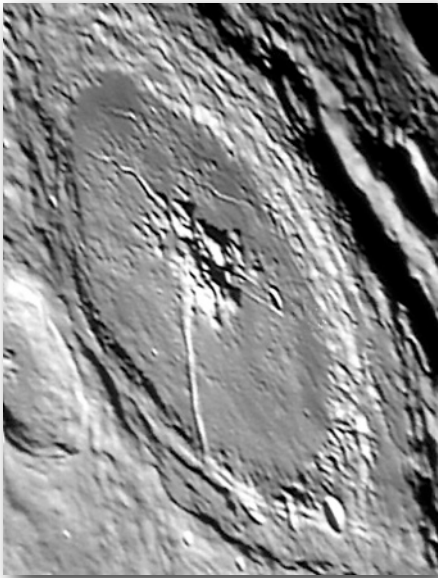
*"one of the finest spots in the Moon: its grand double rampart, on east side nearly 11,000 ft (3,400 m) high, its terraces, and convex interior with central hill and cleft, compose a magnificent landscape in the lunar morning or evening ..."*

The atmospheric seeing this night was so good that I decided to view Petavius at higher magnifications. I first added the TAK 1.6x Tele-Extender (not a Barlow lens) which changed the TOA from an f/7.3 optical system into an f/11.7 system. Then I decided to attach my Tele-Vue Bino-Vue, which increases the f-ratio of the optical system by a factor of 1.8 times. My TAK TOA was now configured into an f/21 system, yielding an effective refractor focal length of 3168 mm. I inserted two Radian 10 mm eyepieces into the Bino-Vue (316x), moved Petavius into the middle of the Bino-Vue's FOV, and just stared! Those of you who have ever used a Bino-Vue attached to a quality APO refractor and viewed the lunar surface near the terminator on a night of excellent seeing will understand my experience. The visual effect, courtesy of observing with two eyes instead of one, appears 3-dimensional in quality. There were so many aspects of Petavius that were visible. The jagged central mountain peaks, 1.7 km high, with their ledges, were a striking sight. Equally impressive was the presence of a major (80 km) rille (fracture) that began near the central mountains and moved across the crater floor and intersected the crater walls. It was the best example of a rille I've observed so far. Finally, the presence of the wide "double rim" wall defined the broad, 3.2 km high, outer crater ramparts. The Petavius image (next page) taken by KC Pau shows many of these interesting features. [cont'd next pg]



*Sea of Fertility with Petavius at Middle Right*

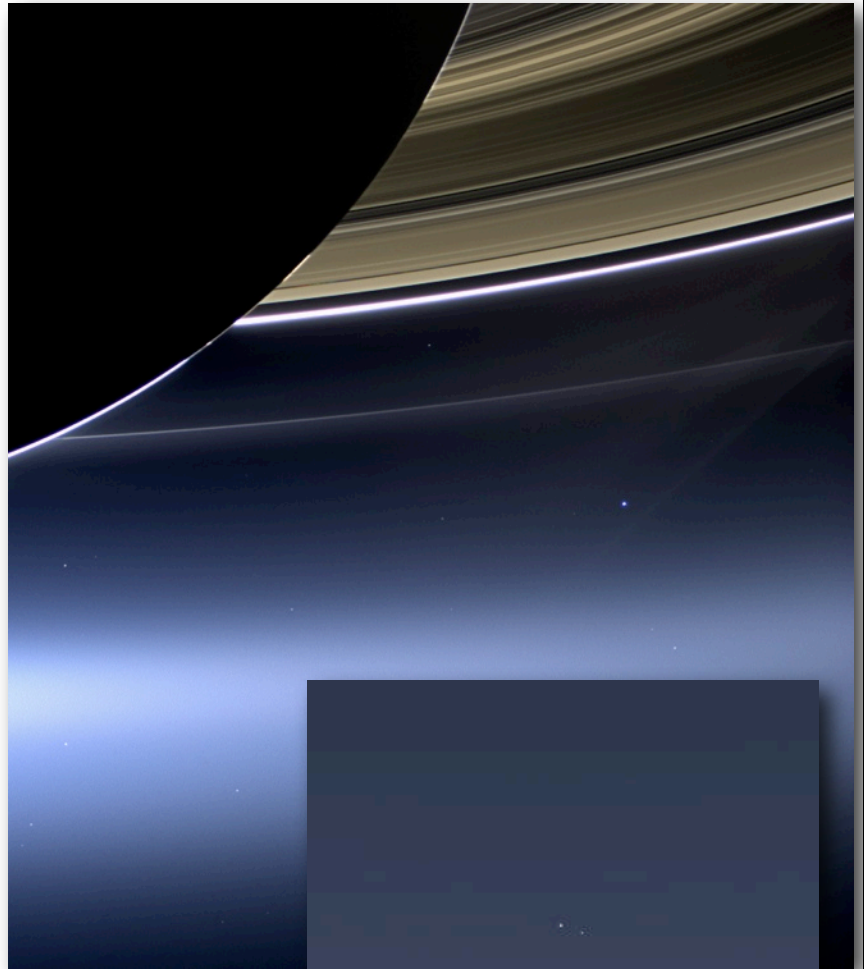
*Wikipedia Image*



**Petavius**, Courtesy of Hong Kong Amateur **KC Pau**, Sept 11, 2003, 10 inch Newtonian, Phillips Toucam

In 1976 Peter Schultz of the Space Science Division at NASA Ames Research Center, identified 206 similar lunar craters and called them FFC's or "Floor Fractured Craters". (<http://www.lpod.org/cwm/DataStuff/ffc.htm>). He noted that they shared similar characteristics; such as volcanic mare-flooded floors, concentric and radial rilles, the presence of dark halo craters on the floors, and were located near a mare. He proposed a formation mechanism in which lunar magma rose up through basin fractures and ponded under the crater floor. It was the pressure of the magma uplift that produced the fractures and rilles seen in the telescope. He went on to classify these "Floor-Fractured Craters" into 6 Classes and he placed Petavius into Class 1. These Class 1 FFCs have central peaks, wall terraces or slumps, an ejecta blanket, floor fractures (rilles), mare patches, and dark halo craters.

Petavius is best observed when the Moon is only 2-3 days past full phase or, more challenging, because of the low elevation, just 3 days after New Moon. You can observe these interesting features of Petavius in the smallest of amateur telescopes. It has been said that the Moon is the easiest object to see but the most difficult object to observe. So, at the next favorable lunation, see how much detail you can observe in and around Petavius.



## The Day the Earth Smiled\*: Sneak Preview

In this rare image taken on July 19, 2013, the wide-angle camera on NASA's Cassini spacecraft has captured Saturn's rings and our planet Earth and its moon in the same frame. It is only one footprint in a mosaic of 33 footprints covering the entire Saturn ring system (including Saturn itself). At each footprint, images were taken in different spectral filters for a total of 323 images: some were taken for scientific purposes and some to produce a natural color mosaic. This is the only wide-angle footprint that has the Earth-moon system in it.

The dark side of Saturn, its bright limb, the main rings, the F ring, and the G and E rings are clearly seen; the limb of Saturn and the F ring are overexposed. The "breaks" in the brightness of Saturn's limb are due to the shadows of the rings on the globe of Saturn, preventing sunlight from shining through the atmosphere in those regions. The E and G rings have been brightened for better visibility.

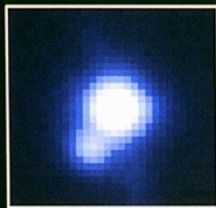
Earth, is 1.44 billion km away in this image, the other bright dots nearby are stars. This is only the third time ever that Earth has been imaged from the outer solar system. The acquisition of this image, along with the accompanying composite narrow- and wide-angle image of Earth and the moon and the full mosaic from which both are taken, marked the first time that inhabitants of Earth knew in advance that their planet was being imaged. That opportunity allowed people around the world to join together in social events to celebrate the occasion.

For more information about the Cassini-Huygens mission visit <http://www.nasa.gov/cassini> and <http://saturn.jpl.nasa.gov>. The full story for this article is at: [http://science.nasa.gov/science-news/science-at-nasa/2013/23jul\\_palebluedot/](http://science.nasa.gov/science-news/science-at-nasa/2013/23jul_palebluedot/)

*\*[If you went out to "Smile and Wave" at 5:37 pm EDT July 19, I hope you did not get too wet, or blown away or struck by lightning. You may recall that Friday was the day a major storm moved through the Bruce-Grey region knocking out power and blowing down trees, etc. It even knocked out my ISP pretty much for the whole weekend. No email for 3 days! arghh! -ed]*

*The cameras on NASA's Cassini spacecraft captured this rare look at Earth and its moon from Saturn orbit on July 19, 2013. This is the second time that Cassini has imaged Earth from within Saturn's shadow, and only the third time ever that our planet has been imaged from the outer solar system.*

*Earth is the blue point of light on the left; the moon is fainter, white, and on the right. Images were obtained at a distance of 1.445858 billion km from Earth. Image scale on the Earth is 8,662 km per pixel..*



Ground Based



HST/FOC

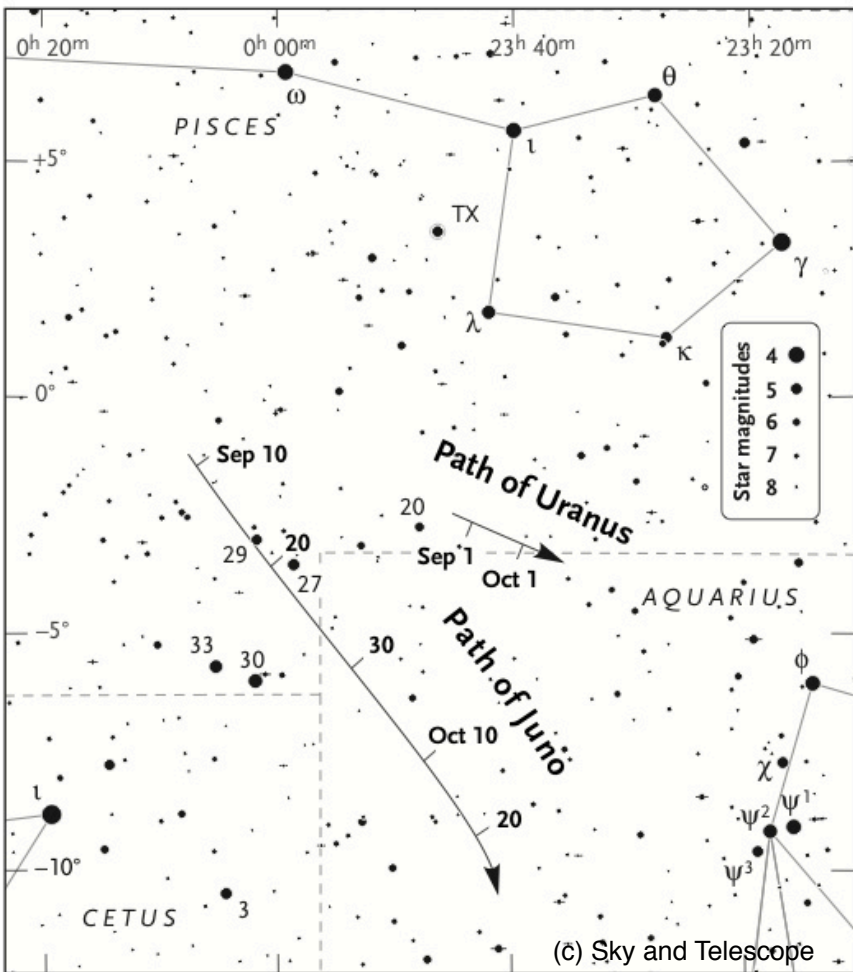
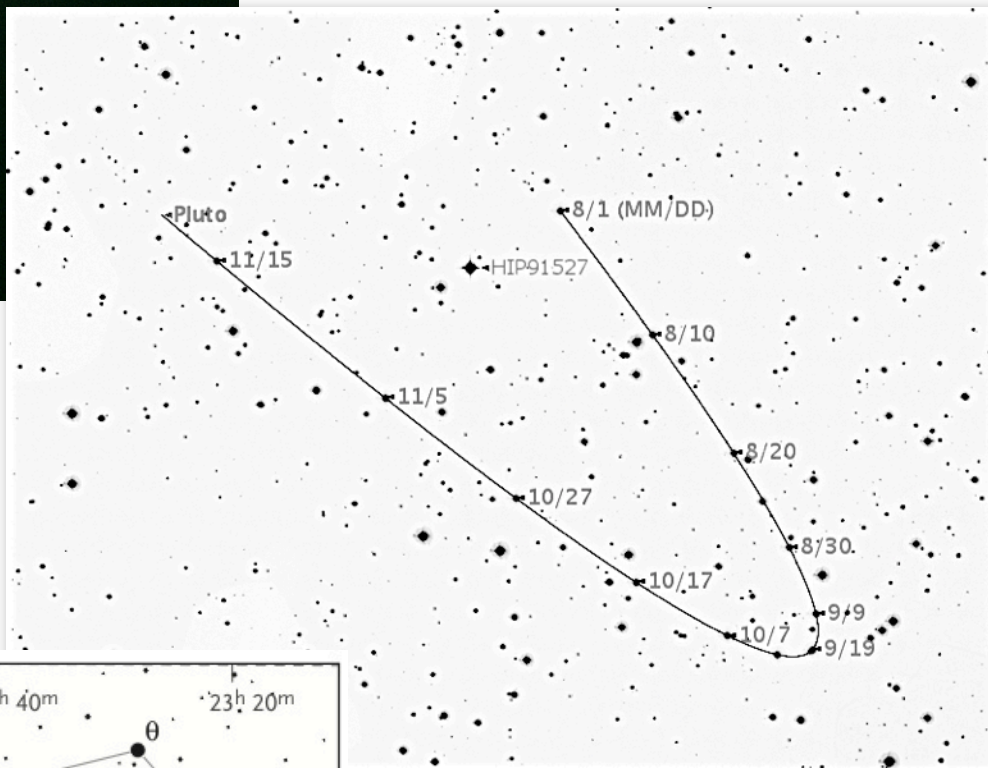


Pluto & Charon as you'll never see them... imaged by Hubble & the joint Canada-France-Hawaii Telescope. (Credit: NASA/ESA/ESO)

Although Pluto is in a star-studded part of the Milky Way in 2013, accurate star charts can be used to locate it this fall. A minimum aperture of around 8 inches is required to pick up the 14th magnitude dwarf planet, so the 10-inch Meade should be capable. The 28-Webster should have no trouble. Don't expect surface features though...

## Pluto to be Hunted Down at ES Fox Sep 7

Pluto Finder Chart for Aug 1 (8/1) to Nov 15 (11/15) generated by Starry Night Pro. The Sep 7 BAS viewing session will target Pluto. Position on chart labelled 9/9 is closest to this date but Pluto will not move much in 2 days. Faintest stars shown on chart are magnitude 14.



## Juno Also in the Crosshairs

Right now asteroid 3 Juno is having an especially favorable apparition, making it about a magnitude brighter than it usually gets. It's magnitude 8.2 on September 1st, 7.7 at opposition on September 21st, 7.8 on October 1st, 8.2 on November 1st, and 8.9 on December 1st.

Juno is positioned beneath the Great Square of Pegasus near the intersection of Pisces, Cetus, and Aquarius and close to the planet Uranus.

Juno was found by German astronomer Karl Ludwig Harding in September 1804, only three years after the discovery of the first asteroid, 1 Ceres. Yet it was a lucky find. With a diameter of 234 km, Juno is only the 10th largest asteroid, and it's by far the smallest of the four found from 1801 through 1807. After that no others turned up until 1845, long enough for the idea of "four minor planets" to become entrenched in astronomy literature. In fact, astronomers of that era considered Ceres, Pallas, Juno, and Vesta part of the Sun's planetary retinue and even assigned them planetary symbols.

The NASA spacecraft named imaged Ceres and Vesta, but it might be a very, very long time before we get close-up views of Juno.

From a post by Kelly Beatty, Sep, 2009 S&T

(c) Sky and Telescope

M31 (the Andromeda galaxy)



**New Distance to M31 = 2.50 MLY**

*by Nancy Atkinson Universe Today correspondent*

M31 and M33 are two of the nearest spiral galaxies, and can form the basis for determining distances to more remote spiral galaxies and constraining the expansion rate of the Universe (the Hubble constant). Hence the relevance and importance of several new studies that employed near-infrared data to establish solid distances for M31 (Andromeda) and M33 (Triangulum) (e.g., Gieren et al. 2013), and aimed to reduce existing uncertainties tied to the fundamental parameters for those galaxies.

Gieren et al. remarked that, "a number of new distance determinations to M33 ... span a surprisingly large interval ... which is a cause of serious concern. As the second-nearest spiral galaxy, an accurate determination of [M33's] distance is a crucial step in the process of building the cosmic distance ladder."

The new Gieren and Riess et al. distances are based on near-infrared observations, which are pertinent because radiation from that part of the electromagnetic spectrum is less sensitive than optical data to absorption by dust located along our sight-line. Properly accounting for the impact of dust is a principal problem in cosmic distance scale work, since it causes targets to appear dimmer. "different assumptions about [dust obscuration] are a prime source for the discrepancies among the various distance determinations for M33," noted Gieren et al., and the same is true for the distance to M31 (see Riess et al.).

The Gieren and Riess et al. distances to M33 and M31, respectively, were inferred from observations of Cepheids. Cepheids are a class of variable stars that exhibit periodic brightness variations (they pulsate radially). Cepheids can be used as distance indicators because their pulsation period and mean luminosity are correlated. That relationship was discovered by Henrietta Leavitt in the early 1900s. Gieren et al. observed 26 Cepheids in M33 and established a distance of ~2,740,000 lightyears. The team added that, "As the first modern near-infrared Cepheid study [of] M33 since ... some 30 years ... we consider this work as long overdue ..."

M33 (the Triangulum galaxy)



**New Distance to M33 = 2.74 MLY**

The distances to M33 shown below convey seminal points in the evolution of humanity's knowledge. The scatter near the 1920s stems partly from a debate concerning whether the Milky Way and the Universe are synonymous. In other words, do galaxies exist beyond the Milky Way? The topic is immortalized in the famed great debate (1920) featuring H. Shapley and H. Curtis (the latter argued for an extragalactic scale). The offset between the pre-1930 and post-1980 data result in part from a nearly two-fold increase in the cosmic distance scale recognized circa 1950 (see also Feast 2000). Also evident is the scatter associated with the post-1980 distances, which merely reinforces the importance of the new high-precision distance estimates.

Riess et al. obtained data for some 70 Cepheids and determined a distance for M31 of ~2,450,000 lightyears. The latter is corroborated by a new study by Contreras Ramos et al. 2013 (d~2,540,000 ly), whose distance estimate relied on data for stars in a M31 globular cluster.

Gieren et al. utilized the 8.2-m Very Large Telescope (Yepun), while Riess and Contreras Ramos et al. analyzed observations from the Hubble Space Telescope. Riess et al. acquired images of M31 via the new Wide-field Camera 3, which replaced the Wide-field and Planetary Camera 2 ("The Camera That Saved Hubble") during the famed 2009 servicing mission.

The new results mark the culmination of a century's worth of effort aimed at securing precise distances for our Galaxy's local spiral kin (M31 and M33). Read more: <http://www.universetoday.com/102445/astronomers-refine-distances-to-our-closest-spiral-galaxy-neighbors/#ixzz2Vusgkpi1>

Read more: <http://www.universetoday.com/102445/astronomers-refine-distances-to-our-closest-spiral-galaxy-neighbors/#ixzz2VusWBOil>

# Ophiuchus (Oph)

α-Ophiuchi - Ras Alhague    β-Ophiuchi - Cheleb  
 δ-Ophiuchi -Yed Prior        ε-Ophiuchi-Yed Posterior  
 ζ-Ophiuchi -Han            η-Ophiuchi - Sabik            λ-Ophiuchi - Marfic

Ophiuchus and Serpens, the Serpent, although considered to be two separate constellations, actually have several stars in common. On the chart Serpens is indicated by the broken line and Ophiuchus by the solid line, Serpens is further broken down into two parts; Serpens Caput, the Serpent's Head, and Serpens Cauda, the Serpent's Tail. It is counted as only one constellation. The Serpent forms a giant semicircle of stars in the sky; taken together, the two constellations seem to indicate the shape of a giant ostrich. The head of the Serpent is about 7° south of Corona Borealis. Ras Alhague, the brightest star in Ophiuchus, is at one corner of a huge isosceles triangle formed by itself, Altair in Aquila, and Vega in Lyra, Altair is at the apex of the triangle and lies to the east of the other two. Many clusters lie in the boundaries of these constellations, especially in the southern areas, which lie in the plane of the MW.

## DOUBLE STARS

	Mag.	Sep (s)	Location	Remarks
η	3.0-3.4	1	170716	
ο	5.4-6.9	11	171524	Yellow-Blue.
ρ	5.2-5.9	3	162223	Yellow-Blue.
19	6.0-9.0	23	164502	
36	5.3-5.3	4	17122	Yellow-Red.
53	5.8-8.2	41	173210	
61	6.2-6.6	21	174203	
67	3.9-8.0	55	175803	Yell-Purp; striking contrast.
70	4.3-6.0	4	180303	Yellow-Purple.
Σ2166	5.6-7.4	27	172612	White-Pale Blue.
Σ2173	6.1-6.1	0.7	172801	
P236	6.1-8.3	4	165419	

## MESSIER OBJECTS (OPH)

	Mag	Location	Remarks
M 9	7.3	171618	Globular Cl. Many minute stars.
M 10	6.7	165504	Globular Cl. Rich in stars; easy to resolve.
M 12	6.6	164502	Globular Cl. Very fine and bright, with condensed center. Easy to resolve.
M 14	5.7	173503	Globular Cluster. Very large.
M 19	6.6	170026	Globular Cluster.
M 62	6.6	165830	Globular Cluster.
M 107	9.2	163013	Globular Cluster.

## Other Objects of Interest in Ophiuchus

V-Ophiuchi -Long per (298 days) var. max. mag. 7.5. Location 162312

# Serpens Caput & Serpens Cauda

## DOUBLE STARS (SERPENS CAPUT)

	Mag.	Sep (s)	Location	Remarks
β	3.7-9.0	31	154416	
δ	4.2-5.2	4	153211	Pale Yellow-Ashen; beaut.
ψ	5.2-10.0	11	151702	
Σ1931	6.2-7.6	13	151610	
Σ2007	6.5-8.0	35	160313	

## DOUBLE STARS (SERPENS CAUDA)

θ	4.5-5.4	22	185404	Both Deep Yellow
ν	5.0-9.0	47	171813	Green-Lilac

## MESSIER OBJECTS (SERPENS CAPUT)

	Mag	Location	Remarks
M 5	6.2	151602	Globular Cl. Called almost as good as the Hercules Cluster; a very beautiful object. [Yes, indeed! -ed]

## MESSIER OBJECTS (SERPENS CAUDA)

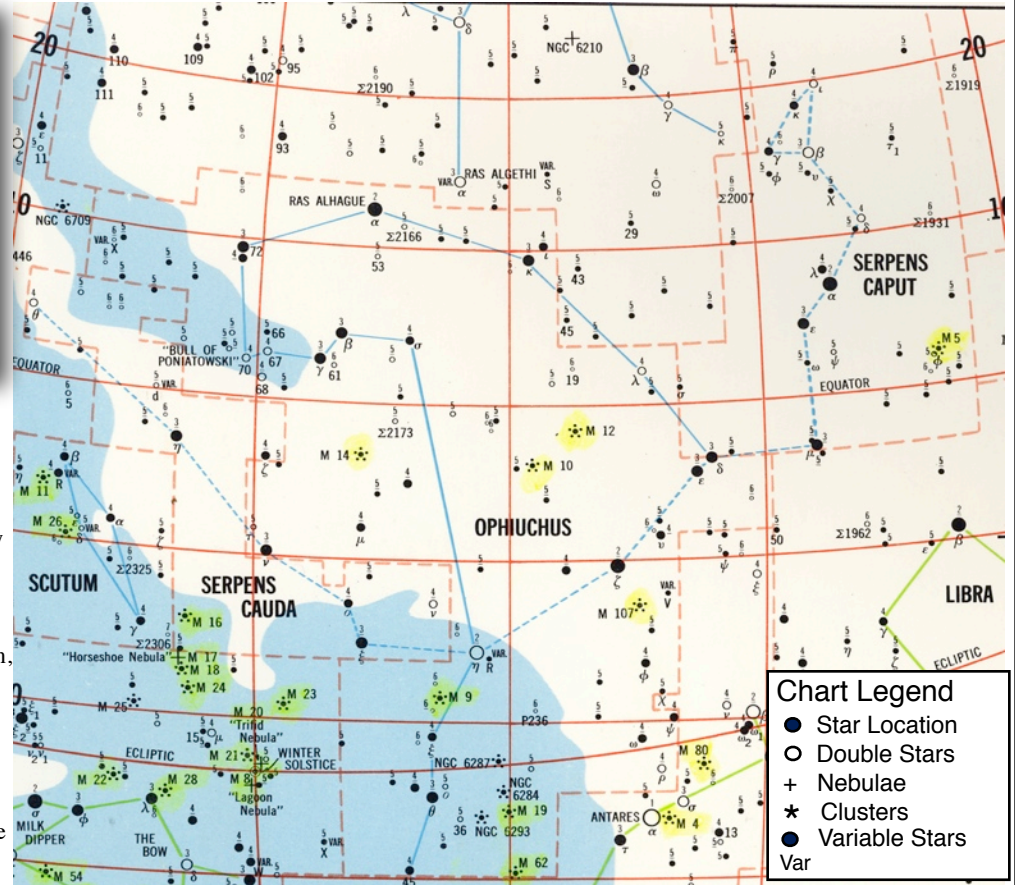
M 16	6.4	181614	Open Cluster. [Eagle or Star Queen Nebula surrounds cluster. -ed]
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Messier 5 Globular Cluster in Oph.



### From Messier's notebook:

The night of May 23 to 24, 1764, I have discovered a beautiful nebula in the constellation of Serpens, near the star of sixth magnitude; the fifth according to the catalog of Flamsteed. That nebula doesn't contain any star; it is round, & could have a diameter of 3 arc minutes; one can see it very well, under a good sky, with an ordinary [non-achromatic] refractor of one foot [FL]. I have observed that nebula in the Meridian, & I have compared it to the star Alpha Serpentis. Its position was right ascension 226d 39' 4", & its declination 2d 57' 16" north. On March 11, 1769, at about four o'clock in the morning, I have reviewed that nebula with a good Gregorian telescope of 30 pouces [inches], which magnified 104 times, & I have ensured that it doesn't contain any star.



- Aug 3 Moon at apogee (405 832 km)  
Jupiter 4° N of Moon  
**Juno at opposition (mag 9.0)**
- Aug 4 Mars 5° N of Moon  
Mercury 7° S of Pollux in Gemini
- Aug 5 Mercury 4° N of Moon
- Aug 6 New Moon rises locally at 6:08 am DST**
- Aug 9 Venus 5° N of Moon
- Aug 12 **Spica 0.6°S of Moon, occultation (not vis. here)**  
**Perseid Meteor Shower 90/h Moon FQ sets 10:30 pm**
- Aug 13 Saturn 3° N of Moon
- Aug 14 First Quarter Moon rises at 1:36 pm DST**
- Aug 18 Moon at perigee (362 264 km)
- Aug 19 Mars 6° S of Pollux
- Aug 20 Full Moon rises at 7:48 pm DST**
- Aug 26 Neptune at opposition (mag 7.8)**
- Aug 28 Last Quarter Moon rises at 12:26 am DST**
- Aug 31 Jupiter 4° N of Moon

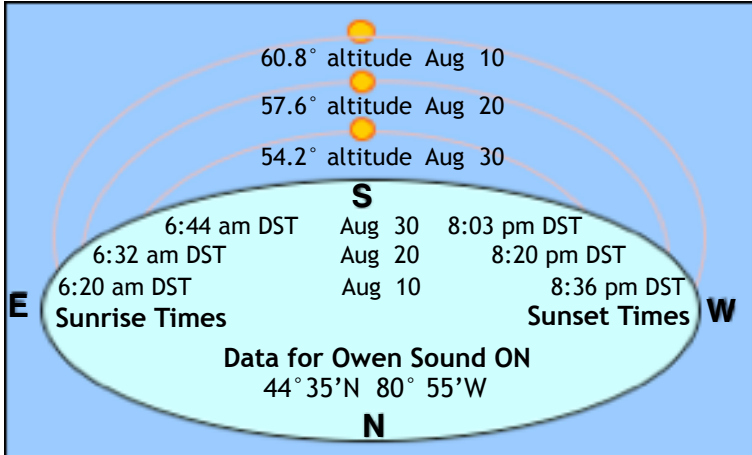
## Planets

**MERCURY**, started back towards the sun in the last week of July and by mid-month is too close to the sun for viewing. It emerges in Sep as an Evening Star. **VENUS**, (-3.9), is a bright Evening Star low above the western horizon all month. **MARS** (1.6) is a dawn planet and increases its separation from Jupiter to 18°. **JUPITER**, (-2.0) is getting higher in the sky at dawn (40° by Aug 31). Jupiter, Mercury, Mars and the crescent Moon are grouped near each other Aug 3 and 4. The last crescent Moon is 5° away from Jupiter on Aug 31. **SATURN**, (mag 0.7) is well past the meridian at sunset and low in the western sky setting before midnight. By Aug 31, it is setting by the end of twilight. Saturn viewing is pretty much done for the rest of the year. Both **URANUS**, (5.7) and **NEPTUNE**, (7.8) are above the horizon by 11 pm in Aug. They straddle the meridian by 1 am at the end of the month. Both **asteroids, Vesta (7.8)** and dwarf planet, **Ceres (8.1)** are now too close to the sun to observe. **PLUTO** (mag. 14) is in dark sky for much of the night and well-placed for viewing in Aug. The September BAS@Fox viewing night will target Pluto.

Diagram below gives the sunrise/sunset times and sun's altitude on three dates this month. The sun is now dropping in elevation. The Aug moon 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.

## BAS Events

- Jul 30 Tues Summer Stargazing-1** ES Fox 7:30 pm talk, star tour follows weather permitting. Bring bug spray. Dress warmly!  
**Fees:** \$10/adult, kids under 18 free (proceeds support astronomy education)
- Aug 3 Sat BAS viewing @Fox@dark**, backup Aug 31 (last cres)
- Aug 6 Tue Summer Stargazing-2** ES Fox 7:30 pm talk, star tour follows, weather permitting. See note for July 30 above.
- Aug 7 Wed NO BAS meeting**
- Aug 8-11 Starfest** <http://www.nyaa.ca/>
- Aug 11/12/13 PERSEIDS** 90/h ES Fox @dark, Moon sets 11 pm
- Aug 16 Fri Public viewing** Grey Roots Mus. 9 pm, backup Aug 17 (Members required with scopes) FQ moon
- Aug 13 Tue Summer Stargazing-3** ES Fox 7:30 pm talk, star tour follows at Fox. See note for July 30 above. (NM)
- Aug 20 Tue Summer Stargazing-4** ES Fox 7:30 pm talk, followed by star tour at Fox. See note for July 30 above. (FM)
- Aug 24 Sat MacGregor Park** star talk/tour 8 pm, BAS members with scopes appreciated
- Aug 27 Tue Summer Stargazing-5** ES Fox 7:30 pm talk, followed by star tour at Fox. See note for July 30 above. (LQ-1)



## Special Events

## Perseid Meteor Shower

The Perseid meteor shower will reach peak activity on the nights of Aug 11/12 and 12/13 this year. And during the best part of the shower (just after midnight) the Moon will be absent from the sky. The FQ Moon sets at 11 pm on the 12th (30 min sooner on the 11th) so it will be a dark sky for the remainder of the evening. By midnight the radiant in Perseus will have risen to 40 degrees and the shower should be at its best until the sun rises in the east. Viewing is scheduled at the Fox for Monday and Tuesday night so hopefully one or, dare we wish it, both of those nights will be clear and we should get our fill of the "Tears of St.Lawrence."

The Roman Emperor Valerian ordered the executions of a number of Roman Catholic Bishops, Priests and Deacons in 258 AD including Laurentius (St.Lawrence) whose martyrdom is celebrated Nov 10. Oddly, the list included Pope Sixtus II but St. Lawrence must have had a better press agent since it is he that is associated with the meteor shower. Note the grilling iron being held by Laurentius in the image at right. Make your own conclusions.



## Aug 2013

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

**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. You need to provide a mount like a heavy-duty tripod, or a regular equatorial or azimuth mount). A short training session will be provided on pickup.

**One 12-inch Dob still available.**

One 12-inch telescopes has been spoken for but the other is still available for the summer. We have two **8-inch dobsonians** for free member loan as well. Contact Brett T. or Aaron T. Scopes come in and out periodically so keep checking with Brett or Aaron if you are interested in a loaner.



**SGN Classified Ads Section**

(Now also on our website)



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

**New Lower Price!**

15.1 Mp Excellent noise reduction features for night photos. Includes spare battery and charger, strap, software and manual.

Asking \$ 500. John H. 519 371-0670 [stargazer@wightman.ca](mailto:stargazer@wightman.ca)

Information about the 50D can be found here:

[http://en.wikipedia.org/wiki/Canon\\_EOS\\_50D](http://en.wikipedia.org/wiki/Canon_EOS_50D)

and here: <http://www.imaging-resource.com/PRODS/E50D/E50DA.HTM>

**FOR SALE: Meade LX75 telescope mount**

Meade LX75 with the 497 AutoStar hand controller (GOTO system). It comes with two balance weights and 12 V power supply. This mount is a medium-duty mount that will support 30 pounds. Vixen-style dovetail mount suitable for up to 5 or 6-inch refractors or up to 9.25-inch SCT. Asking \$350.00

See <http://www.cloudynights.com/documents/lx75.pdf> or [http://www.cloudynights.com/item.php?item\\_id=2014](http://www.cloudynights.com/item.php?item_id=2014) for more information.

Contact Brett Tatton ([bretttatton@gmail.com](mailto:bretttatton@gmail.com))

**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](mailto:ravand@rogers.com)



**New Release: Limitless Jazz CD by Rob Tardik**

The happy guy below is smiling because his latest jazz CD has just been released and a single called "One World" is already top-rated. It is now in its second week

at the top of the "Smooth Jazz Now Top 50" chart. According to John Beaudin: "Rob Tardik is getting some strong confirmation that his new album 'Limitless' will be a big hit." The first single "One World" has stayed at #1 for a second straight week. "Rob's music is as good as it gets in this format," says John Beaudin, Operations Manager of AirCom Radio network. "Combine his excellent and his great attitude and you have a winner," adds Beaudin.

The gorgeous black and violet (or is that magenta?) of the CD cover is quite striking and sure to draw attention. The colour scheme even matches Rob's shirt. BUT, look closely at the album cover and you will see that the image is actually the ES Fox Observatory -there is our elm tree! This photo was shot on the night of the Apr 13, 2012 auroral display and was published in the Sky News March/Apr issue (see pg 38) where Rob spotted it. He liked it so well, it now graces the cover of his album (much to my pleasure!)

So, if you want a jazz experience to go along with the celestial one, copies of his CD (with Rob's autograph) are available at his website [www.RobTardik.com](http://www.RobTardik.com).



"...Rob exudes virtuosity and tasteful playing in a variety of musical styles with his signature smooth sound..."

[www.RobTardik.com](http://www.RobTardik.com)

Balance Energy Laughter Love