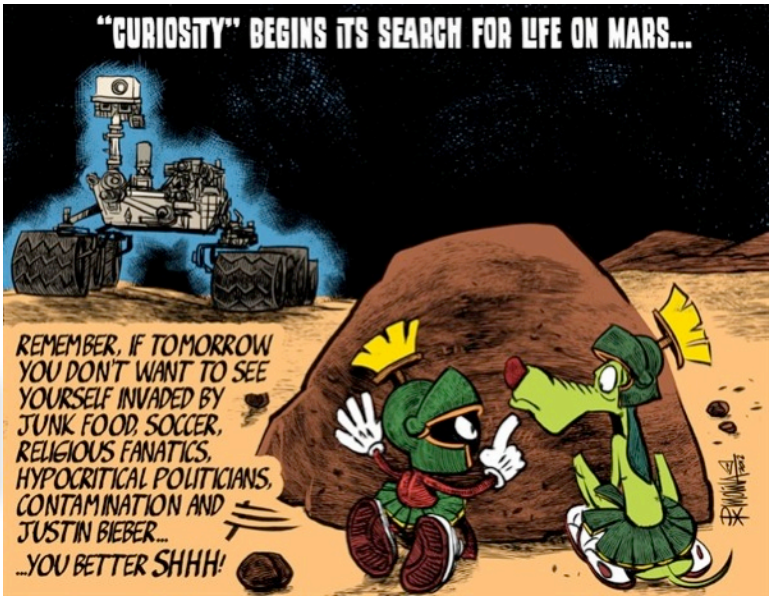
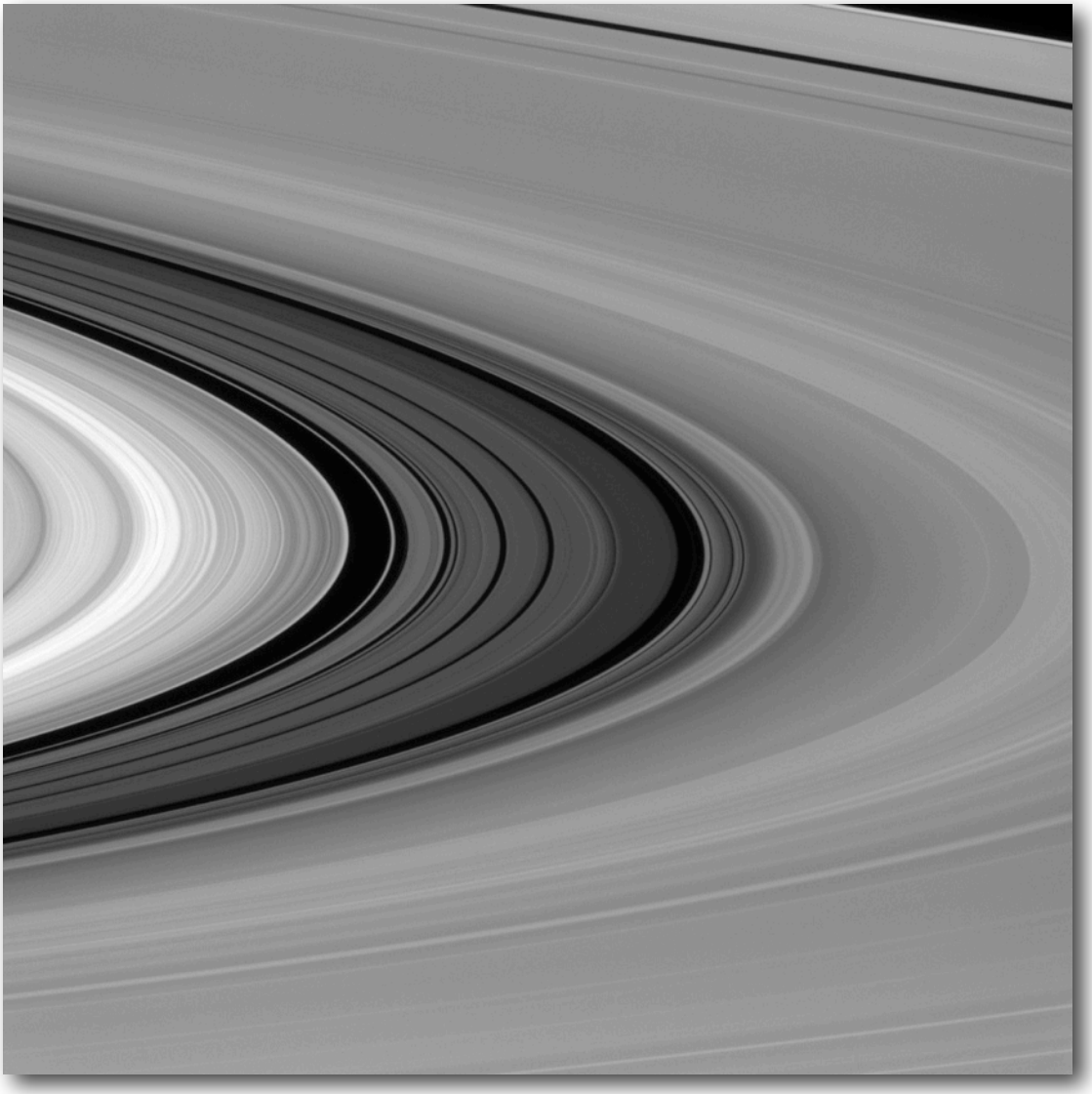
Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 10 No.5 May 2016



If you can name both characters hiding behind the rock you are showing your age just a bit.. (Answer on bottom of page 14)

May 2016 Contents



Cassini's Division

It's difficult to get a sense of scale when viewing Saturn's rings, but the Cassini Division (seen here between the bright B ring and dimmer A ring) is almost as wide as the planet Mercury. (See PIA11142 for a labeled panorama of features in the rings.)

The 4,800 km wide division in Saturn's rings is thought to be caused by the moon Mimas. Particles within the division orbit Saturn almost exactly twice for every time that Mimas orbits, leading to a build-up of gravitational nudges from the moon that sculpt the outer edge of the B ring and keep its particles from drifting into the Cassini Division.

This view looks toward the sunlit side of the rings from about 4° above the ring plane. The image was taken in visible light with the Cassini spacecraft narrow-angle camera on Jan. 28, 2016.

The view was acquired at a distance of approximately 1.2 million km from Saturn and at a Sun-Saturn-spacecraft, or phase, angle of 76 degrees. Image scale is 7 km/pixel.

The Cassini mission is a cooperative project of NASA, ESA and the Italian Space Agency. JPL manages the mission for NASA.
Credit: NASA/JPL-Caltech/SSI

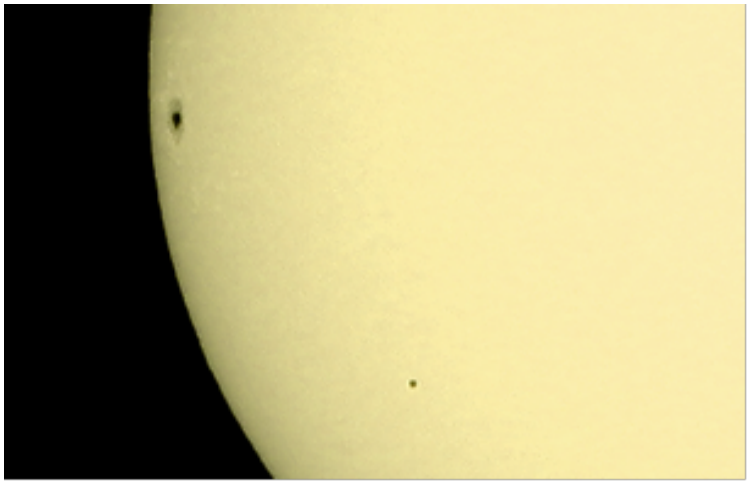
BAS Executive 2015-2017

President:	John Hlynialuk	stargazerjohn@rogers.com
Vice-President:	Zoë Kessler	zoe@zoekessler.com
Secretary:	Lorraine Rodgers	lrodgers@bmts.com
Treasurer:	Cheryl Dawson	cheryl.dawson@bell.net
Past-Pres.	Aaron Top	aarontop@hotmail.com
Past-Past-Pres:	Brett Tatton	bretttatton@gmail.com
Membership:	David Skelton	dskel@golden.net
Social Media:	Zoë Kessler	zoe@zoekessler.com
Member-at-Large:	Robert Atkinson	robotbo@gmail.com

Bluewater OEC Nature Inspired Since 1972-1973 — The Bluewater Education Foundation — E.S. Fox Observatory

Mercury Transit Nov 8, 2006

(from the SGN archives: Vol.1 No.1 Jan 2007 issue)



Mercury Transit: These transit images were taken from the beach at Port Stanley through a TeleVue 101 mm refractor and a 5-inch Mak using a Canon D20. The tiny disk of Mercury was exquisite visually as it glided across the sun but a lot smaller than I recall Venus being in 2004. Actually Mercury's disk is 10" of arc compared to Venus at 58" -about 6 times smaller! In a satellite image cloud cover over Ontario was extensive but there were two holes over Lake Erie as predicted by Clear Sky Clock for the time of the transit. The cloud cover extended right to the east coast but it was clear south of Chicago where Charlie and Sheila S. were watching with the Kankakee *Astrologers*! No wonder they had better weather!
Cropped and enhanced in Photoshop © J. Hlynialuk 2006

BAS & Astronomy Events for May

Event times in DST with 24-h clock unless indicated otherwise

May	**4**	**Wed**	**19:00**	**Regular Meeting Tom Thomson Art Gallery:** Beginner's Forum, Public Welcome
			13:45	Eta Aquarid Meteor Shower: ZHR = 60
	5	Thu	23:14	Moon at Perigee: 357 827 km
	6	Fri	14:30	**NM** rises locally at 6:19 am DST
	7	**Sat**	**@dark**	**Fox Dark of Moon Viewing night BAS members and Guests**
	8	**Sun**	**03:21**	**Aldebaran 0.5° S of Moon** Occultation not visible locally.
	9	**Mon**	**10:10**	**Mercury Inferior Conj. Transit of Mercury!** 7:12 am to 2:42 pm DST, Observing at Fox
May 9 to 15 ASTRONOMY WEEK				
	13	Fri	12:02	**FQ Moon** rises 12:49 pm DST
	14	Sat		**International Astronomy Day** public viewing @Fox
			02:06	Regulus 2.5° N of Moon
	15	Sun	04:30	Jupiter 2.2° N of Moon
	18	Wed	09:07	Spica 5.7° S of Moon
			17:06	Moon at Apogee: 405 933 km
May 19 - 23 AstroCATS 2016 (see below)				
	21	Sat	16:15	**Full Moon** rises at 8:37 pm DST (Smallest in 2016)
	22	**Sun**	**06:15**	**Mars at Opposition (magnitude -2.0) 18.3" of arc diameter.**
			16:59	Saturn 3.5° S of Moon
	29	Sun	07:12	**LQ Moon** rises locally at 1:56 am DST

AstroCATS 2016
Fanshawe College
London, Ontario
May 19 -23, 2016

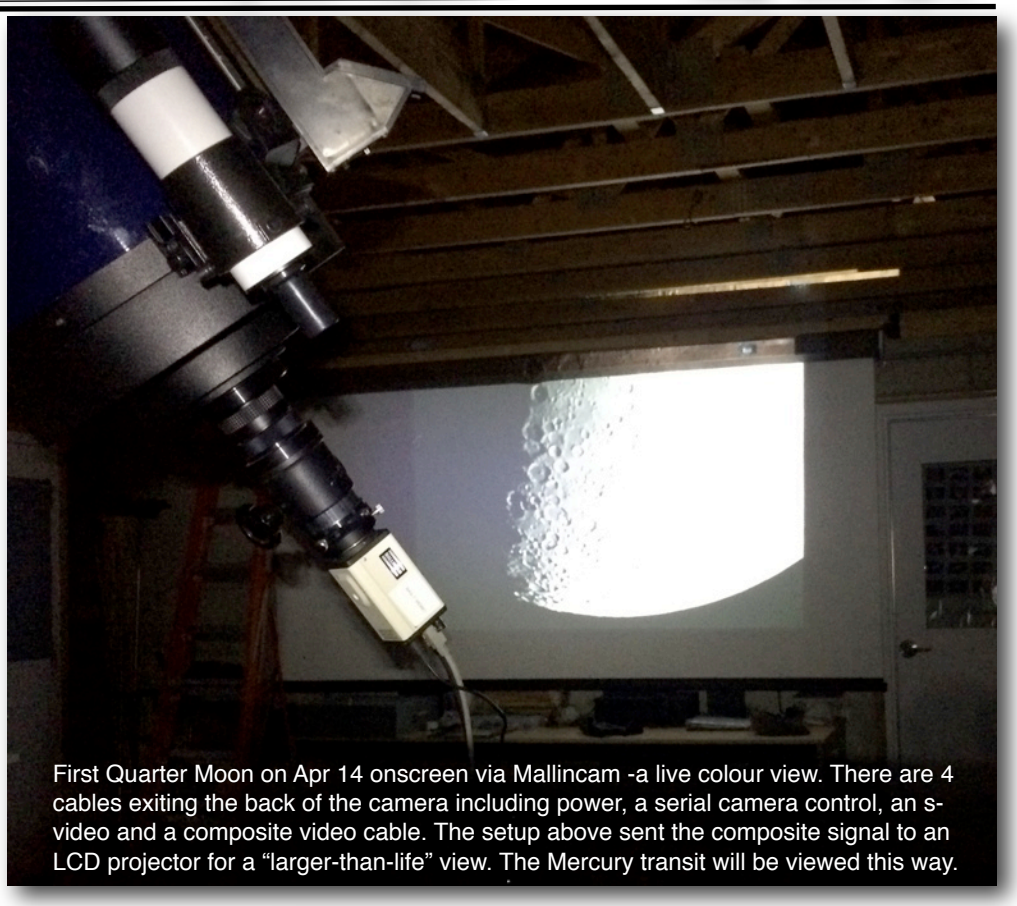
By clicking here you will be taken to the RASC national Web site, where you will have a choice to register for AstroCATS and the GA. There is no obligation to join RASC, but that option will also be available.

The best part is you can then choose any day to attend for just $20. The $20 gets you admittance to both the GA and AstroCATS. If you purchase a ticket prior to AstroCats you get 20 ballots for our annual major door prize. That pays for your ticket and essentially you get in for free. More info here: http://www.astrocats.ca/

Mallincam Frustrations Mostly Over by John H.

A persistent group of BAS members has been sorting out the details of Mallincam video astronomy in the last year or so. Since BAS purchased the top of the line video camera, the Mallincam "Extreme", Brett T, Frank W, and I have gradually become comfortable with the hardware and software to the point where the camera now is on the telescope imaging more than it sits in the box. Part of the long learning curve has been because the Mallincam is much more than a stand-alone video camera. It is a CCD camera as well and can take long exposure images of deep sky objects that rival those of the best CCD imagers available presently. Controlling the hardware has been a complex and, at times, frustrating process and only a dedicated effort just recently has led to some success in getting the equipment to work up to its potential.

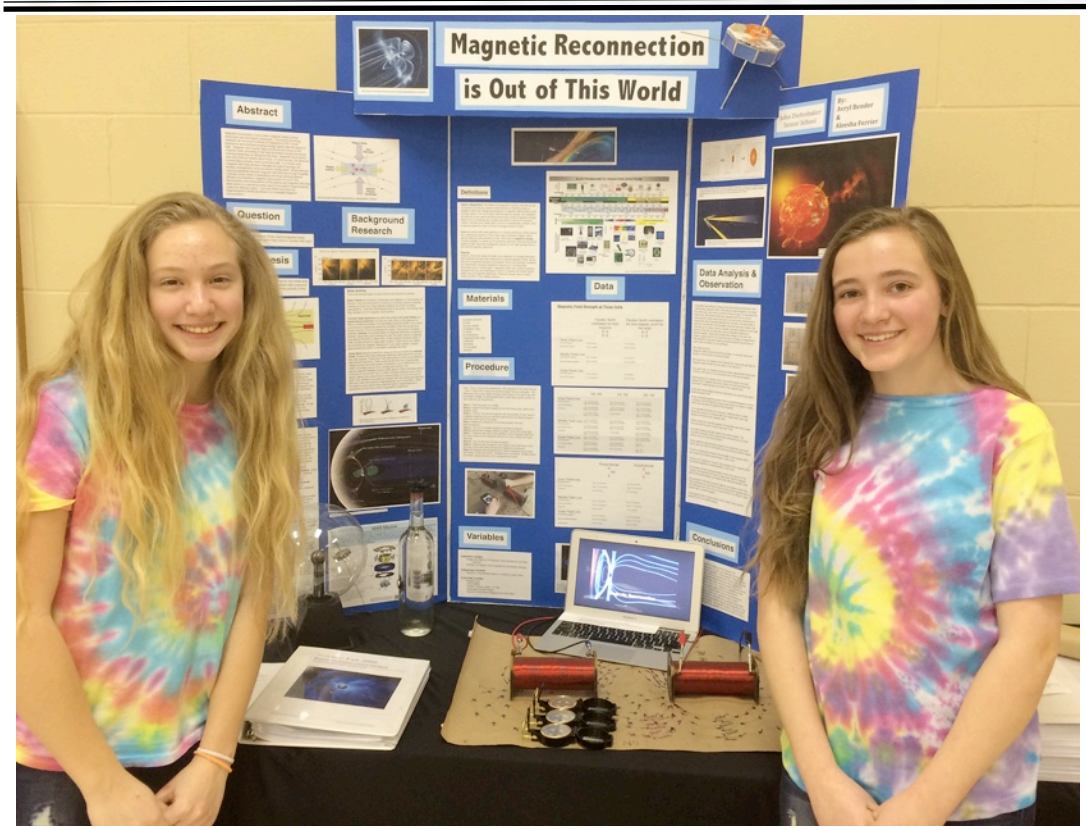
The versatility of the camera is shown in this selection of images taken Apr 14 (right) and Apr 16 (below). The bright Moon can be recorded using the presets and with a few adjustments, faint DSOs at the other end of the brightness scale can be recorded and show more detail than any telescope does to the naked eye. We are looking forward to trying it out on the Webster!



First Quarter Moon on Apr 14 onscreen via Mallincam -a live colour view. There are 4 cables exiting the back of the camera including power, a serial camera control, an s-video and a composite video cable. The setup above sent the composite signal to an LCD projector for a "larger-than-life" view. The Mercury transit will be viewed this way.

Mallincam view of M51 below reveals several spiral arms clearly as well as the delicate bridge joining the main galaxy to its companion. This image is the more remarkable because the moon (right) was lighting the sky to such an extent that the visual finder scope was useless. Neither image has had hot pixels removed and they show up as sharp blue, green and red dots. Both images have had some minor enhancement and overall noise reduction in Photoshop.

Gibbous Moon image above is a mosaic of two to get the whole view on one frame. Even with the rich-field adapter on the camera, the moon is too large with the 1600 mm focal length of the Bishop 10-inch SCT. The Mallincam does a wonderful job of making a wealth of detail visible and is far better than the B&W video camera we have been using to show the moon to the groups of elementary students who regularly get an astronomy lesson at the Fox.



The Bluewater Regional Science Fair was held on two dates this April as separate senior and junior fairs. BAS provides an Astronomy Award called the Herb Coleman Astronomy Award to a deserving project at both levels.

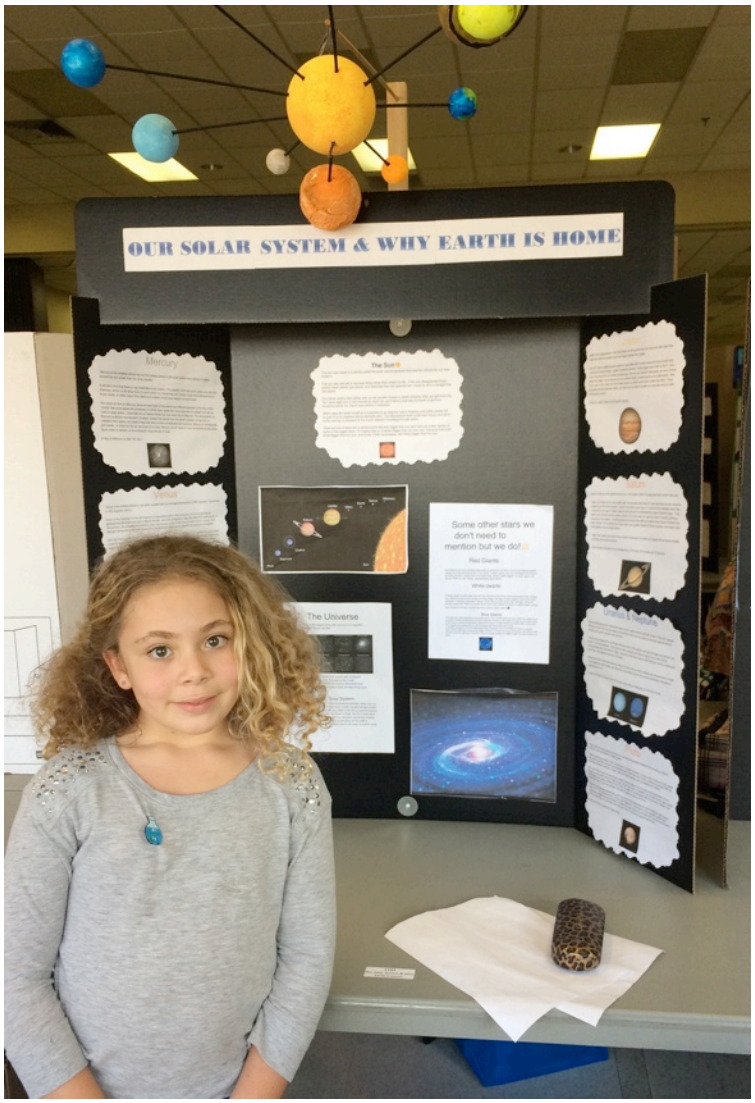
Astronomy Award Winners
Senior Division:
Aleesha Ferrier
Avryl Bender

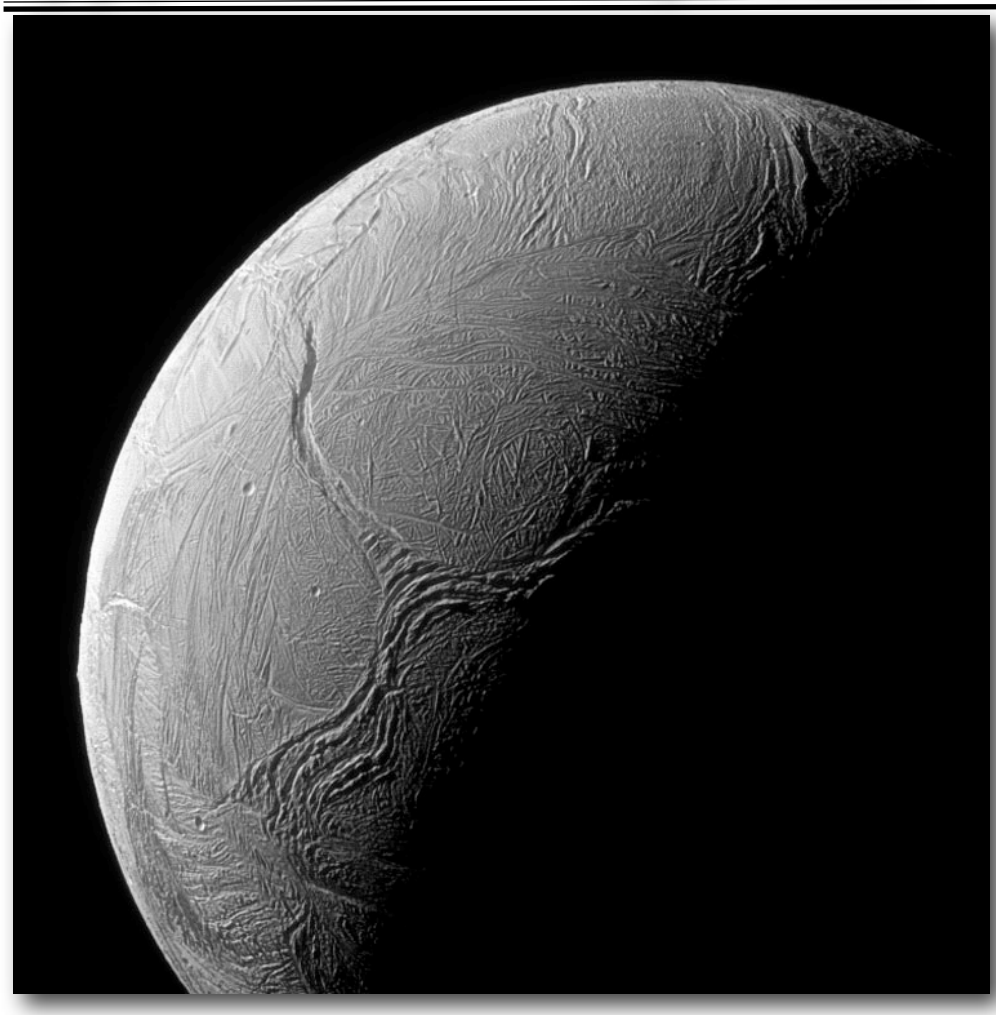
The winners in the senior division are familiar to readers of SGN since they also won in 2015! The topic this time was on solar magnetic fields and examined how aurora are created by re-connection events involving solar magnetic field lines. Aleesha Ferrier and Avryl Bender teamed up again to produce another super astronomy project.

Astronomy Award Winner
Junior Division:
Reynah Neelands

Judges had a more difficult time picking an Astronomy Award winner from the junior projects of the Bluewater Regional Science Fair. Topics ranged from studies of the effectiveness of solar panels to the generation of electric currents with tesla coils. The solar system and its planets were a popular theme and several exhibitors expressed disappointment at Pluto being “kicked out” of the planet club.

The winner in this division was Reynah Neelands and before this judge and she were through we ranged all the way from the dusty surface of Mars to the super-massive black hole at the centre of our galaxy. Ms. Neelands clearly did a lot of homework before she came to the science fair. This will not be the last we will hear from Ms. Neelands.





Y-shaped Discontinuity on Enceladus

A sinuous feature snakes northward from Enceladus' south pole like a giant tentacle. This feature, which stretches from the terminator near center, toward upper left, is actually tectonic in nature, created by stresses in Enceladus' icy shell.

Geologists call features like these on Enceladus (313 miles or 504 kilometers across) "Y-shaped discontinuities." These are thought to arise when surface material attempts to push northward, compressing or displacing existing ice along the way. Such features are also believed to be relatively young based on their lack of impact craters — a reminder of how surprisingly geologically active Enceladus is.

This view looks towards the trailing hemisphere of Enceladus. North is up. The image was taken in visible green light with the Cassini spacecraft narrow-angle camera on February 15, 2016.

The view was obtained at a distance of approximately 60,000 miles (100,000 kilometers) from Enceladus. Image scale is 1,900 feet (580 meters) per pixel.

Credit: NASA/JPL-Caltech/Space Science

Pluto's Halo Craters

The region in image right, is far west of the hemisphere NASA's New Horizons spacecraft viewed during close approach last summer. The image – in black and white – sports several dozen "haloed" craters. The largest crater, at bottom-right, measures about 50 kilometers across. The craters' bright walls and rims stand out from their dark floors and surrounding terrain, creating the halo effect.

In other images taken at the same time, composition data from New Horizons' Ralph/Linear Etalon Imaging Spectral Array (LEISA) indicates a connection between the bright halos and distribution of methane ice [which predominates on crater rims]. The floors and terrain between craters show signs of water ice. Exactly why the bright methane ice settles on these crater rims and walls is a mystery; also puzzling is why this same effect doesn't occur broadly across Pluto.

The view is a mosaic made from two separate images obtained by New Horizons' Long Range Reconnaissance Imager (LORRI). A high-resolution strip taken at approximately 232 metres per pixel is overlain on a broader, low-resolution image taken at 889 metres per pixel. The images were obtained at ranges of 46,400 kilometres and 171,700 kilometres from Pluto, respectively, on July 14, 2015.

The LEISA data came the same day, during the instrument's highest-resolution scan of Pluto, with New Horizons 45,500 kilometres from Pluto, with a resolution of 2.7 km per pixel.

Credits: NASA/JHUAPL/SwRI

Real or Fake Astronomy Photos

Recently a couple of items have appeared in my email that have triggered this "rant" about one of my favourite astronomy activities, -taking star pictures. I have been taking images of astronomical objects for a long time and am privileged to be part of the BAS group of astrophotographers who contribute images to both the BAS website and the pages of this newsletter as well as national publications. As you probably have noticed, all the images used in these publications are credited to the photographer and have detailed notes on equipment, exposures, dates taken, etc. As for our newsletter and website, there are two reasons I do not post images unless that data is provided. First of all, astro-imaging is a demanding process and I think the practitioners deserve the credit, and secondly, there are hints in the notes for others to help them take better astrophotos of their own.

In addition, all images clearly indicate how much if any processing has been done and if they have been "manipulated" in any way. All photos that get posted depict actual events unless otherwise stated.

But, where is the line between a realistic depiction and an artistic one? When does an image cross the boundary between reality and become "art", or between a real image or (less charitably) a fake?

I have no problem with a photographer adjusting the colour of an image of a lake scene, for example, to make it a bit unworldly or change the mood; or pixellating or sharpening an image to make it jump out at you or look like a Group of Seven painting. Those pictures are obviously art to average folk and they even grace a wall or two in my own home.

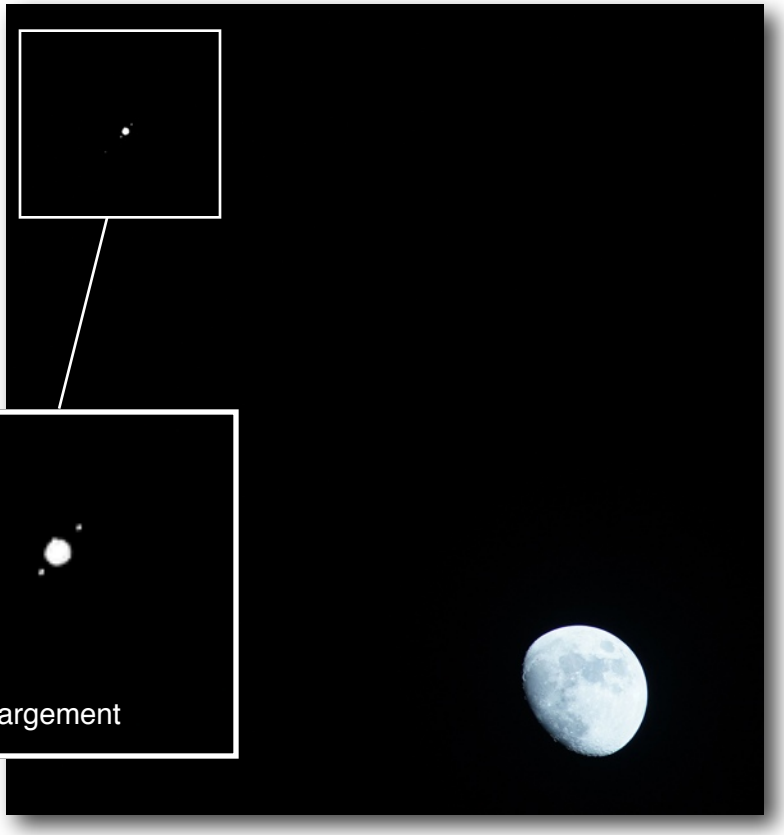
My problem is when a photographer consciously (or by not labeling it as a composite) publishes images purporting to be real astronomical scenes when they could not possibly occur as shown. The classic one that you may have seen, shows a huge crescent moon above the north pole. It looks "real" but any amateur astronomer can see that it is not possible. That image (see it here: http://apod.nasa.gov/apod/ap060620.html) offends most by showing the over-sized Moon at a geographic location where it just does not rise at the time claimed. (cont'd above right)

Fig 1: This image was posted for sale on a local photographer's website. (Name blacked out above). At first sight it looks like a great telescopic shot of a close approach of Jupiter and the Moon. The date/time of the supposed appulse are not given in any caption but can be determined using the phase of the Moon and positions of Jupiter's satellites. Io and Europa were close to Jupiter in the position shown for an hour or two around 11 pm Mar 21. So the "picture" was taken Mar 21, 2016 before midnight. But that night, Jupiter was 2.5° away from the Moon and not the half degree in the image. Clearly the photographer took two separate images that night and pasted them together, and even enlarged the Jupiter image to make the Galilean moon's more visible. This is undoubtedly a nicer image and more sellable but not an accurate depiction of what was visible that night. In the absence of any explanation, people might believe this close pass of Moon and Jupiter actually occurred. The real event is shown in the image below, -a repeat of the event on April 17 and its a different story.

The Straight Goods:

This image, lower right and inset, taken April 17 by Julian Delf almost duplicates the Jupiter/Moon positions and Moon phase of a month earlier (compare to Fig 1 above right). Julian took a pair of images to get proper exposure for each object with a 200 mm telephoto. The FOV is 3° as opposed to the 1° field in Fig. 1 above. Julian's is also a composite image but he states this clearly. Actually, the Jovian moons were visible in his original image, but I have enlarged them in the inset for clarity. Jupiter was NOT pasted in closer to the Moon in Julian's final image! He writes:

> *I thought you might like this picture of Jupiter and the moon at close quarters from last night [April 17]. It is a composite of two images, one exposed for the moon and the other for Jupiter (or at least to get the moons). They were both taken with a 200 mm telephoto on my Sony a77.*
> *Moon : 9:29 pm ISO 100, 1/90th @ f5.6*
> *Jupiter : 9:29 pm ISO 400, 1/2 @ f8.0*
> *Best wishes, Julian*



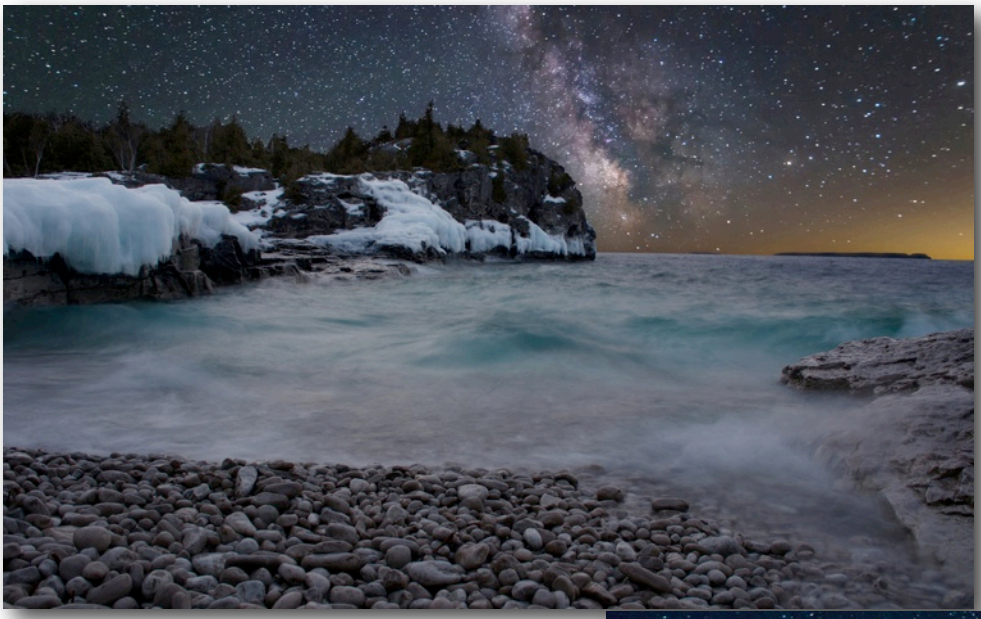


Image left: Another nice Milky Way shot above the cliffs of the Bruce Peninsula? And maybe a great promo shot for the dark skies of the Bruce Peninsula National Park (except for the sickly orange glow at the upper right indicating light pollution?) Selling this image for a poster display may have been the photographer's hope, but as an accurate depiction of what visitors to the park might see, it is totally misleading. This winter view of the ice on the Niagara Escarpment cliffs also shows the Milky Way's Dark Horse between Sagittarius and Scorpius. There is only one problem. The view is towards the north from this beach at Indian Head Cove and the last time I looked the MW was in southern skies from the Bruce Peninsula. This is another example of an obvious paste-up of two separate images.

The one below is even worse.

Image Right: The foreground for the image right was probably shot the same time as the one above. There are some telltale patterns of ice on the cliff on the left that are foreshortened a bit but appear to be the same features. And look at that! The MW is different. (This can be accomplished as follows in Photoshop: Go to Image > Rotate > Flip Horizontal). Either that or our entire galaxy flipped itself on its back and is now arching up the other way or maybe the Earth's axis flipped recently? I must have slept through it.

The same "photographer" has also posted images of the cliffs with northern lights in the background skies, and at this point, I am wondering if the aurora were created in Photoshop as well.

Where is M110?

Image Below: The classic example of a beautiful astro-image which has been doctored is the screensaver Apple provided for its Lion operating system. Mnay of you will recognize Robert Gendler's magnificent image of M31, the Andromeda Galaxy that he took as a mosaic in 2008. The original can be found on his website

here: http://www.robgendlerastropics.com/M31NMmosaic.html and it is worth a visit. It was a 90 hour exposure with a Ritchey-Chretien 20-inch telescope. On his website, Gendler has various resolutions including a huge 1 GB, i.e. 21,904 X 14,454 pixels resolution! So what did Apple do? They removed M110, and all the stars in the foreground are unrecognizable. Why? One theory cited legal issues between Apple and Samsung over the Galaxy S phone aka SHW-M110S. Apple denies any spite in removing M110 from the foreground, claiming artistic license. So back to the original question: How much artistic license should be allowed? I think my opinion is clear: *TRUTH, NOT FAKERY in our astro images, PLEASE!*

An Arizona Morning with the Trifid and the Dumbbell

"*You can observe a lot by watching.*" Yogi Berra

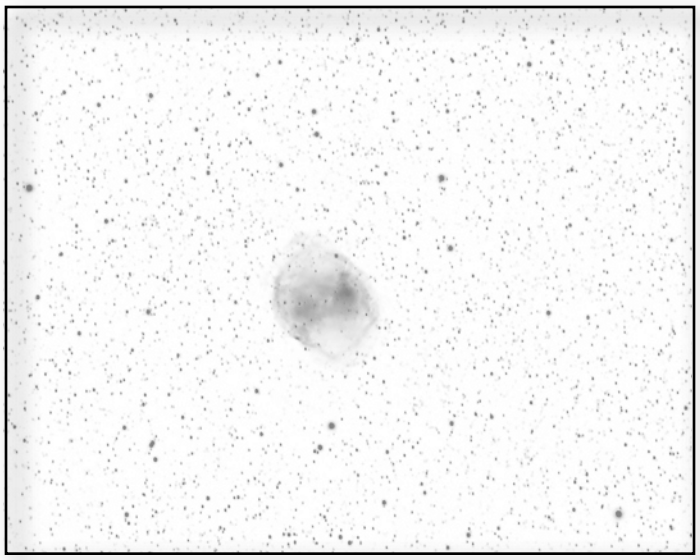
You could blame it on El Nino. This year, during two months at our Arizona hacienda, spring came early and we experienced the longest, continuous, quality observing period ever. The only precipitation we experienced occurred on just three days – with two days of rain and one day of snow flurries. It was dry, and the dust and the pollen were everywhere! When we drove on the gravel roads, our truck developed a substantial rooster tail of fine dust. We had to switch the truck's air conditioning system to its recycle mode to keep the dust out of the cab's interior. Unfortunately, by the middle of March, both Paula and I had developed significant allergy symptoms. So, for the first time in 8 years we felt the need to purchase a humidifier and a HEPA air filtration system. Thankfully, these measures relieved our symptoms somewhat and our hacienda became a relative oasis.

M27, the Dumbbell Nebula is 815 ly away, 1.2 ly in diameter and located in Vulpecula. Finder chart below on pg. 9.

At night, after the winds abated and the dust settled, Paula and I would remove the dust covers from our scopes, and enjoy the beautiful Arizonan skies. Paula had set her CPC 9.25 at the edge of our patio, and I set up my TAK FSQ 106 and TOA 150 about 100 feet further away from our hacienda. This arrangement worked out great because my handheld camera control would take care of my imaging requirements for about 40 minutes and I was then free to join Paula with her telescope.

Imaging and observing on the same night! They are two quite different ways to commune with the night sky. Visual observing at the eyepiece brings immediate rewards, while the joy of imaging occurs later during/after the processing stages. A number of excellent astro-imagers (Don Goldman, Stuart Heggie, and Jack Newton, to name just 3) share their work regularly with me. I love their "astro-art" and I am always impressed with their technical and processing skills.

Don Goldman, in particular, attempts to record the faint details, like the periodic stellar ejections, which occur during the unstable planetary nebula stages of a stars evolution. He captures details, some of them so faint that they have eluded other astro-imagers, by imaging from dark sky sites, and using long exposures through narrow band filters. Then, by his skillful processing routines, he produces not just astro-art, but cutting edge science!



Dumbbell Nebula, Messier 27: *2x3 min exposures, 3200 ISO, Canon 60Da, Tak TOA 150, EM 400 Mount (by Doug Cunningham Mar 16, 2016). Image left is normal colour, image above is a negative image.*

This brings me to two consecutive Arizona nights this past March. The first night, March 16th, a call of nature got me out of bed at 3:30 AM, and, as usual, I checked the skies. The winds had dropped, and Scorpius was riding high in the eastern sky and a well defined Milky Way arched right up through Lyra and Cygnus. I had a perfect, but brief, astro-imaging window. I wanted to bag two of my favourite Messier objects, M27, and M17. The second night, March 17th, I had set the alarm clock for 3:20 AM and again the conditions were perfect. That morning I went after M4, M20, and M8. At the end of both mornings, as I was covering the telescopes back up, I was rewarded by spectacular desert sunrises.

Actually, I didn't finish my processing of these images until after Paula and I had returned home to Ontario.
I have found that for me at least, subtle detail is more easily rendered for my eyes if I convert the image to a black and white version and then invert the black and white features. That way, the bright details within a planetary nebula, or within the spiral arms of a galaxy are more readily seen. The results of this processing for M27 is shown above and my (M20) image is below.

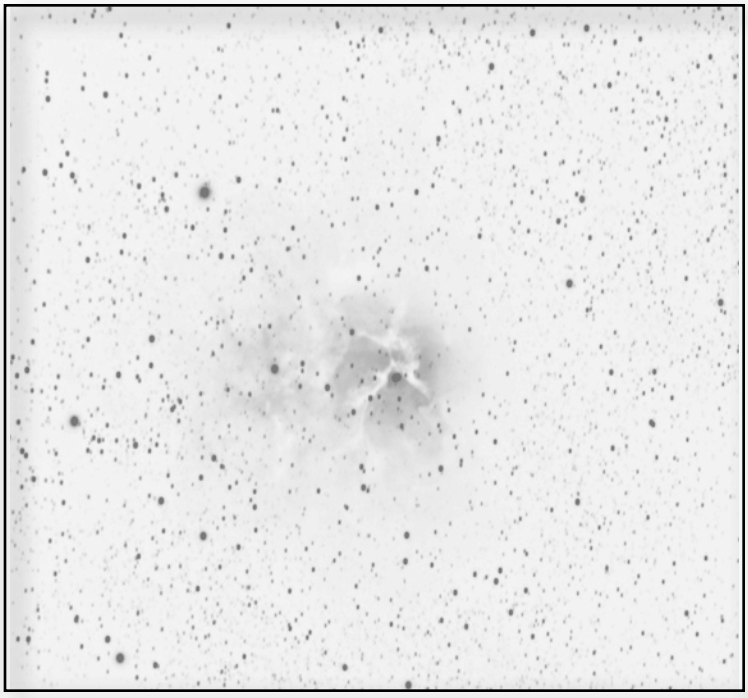
M27 and M20 are unique, and are beautiful and exquisite for different reasons. One of the two, M27, is associated with the death of stars, while the other, M20, is associated with the birth of stars. M27 is called a planetary nebula, and represents the beginning of the end for a normal star's life cycle. The star, after billions of years of fusing hydrogen into helium, oxygen, nitrogen, and carbon returns reworked fusion material to the interstellar medium, and leaves behind a dazzling, high temperature cinder, called a white dwarf.

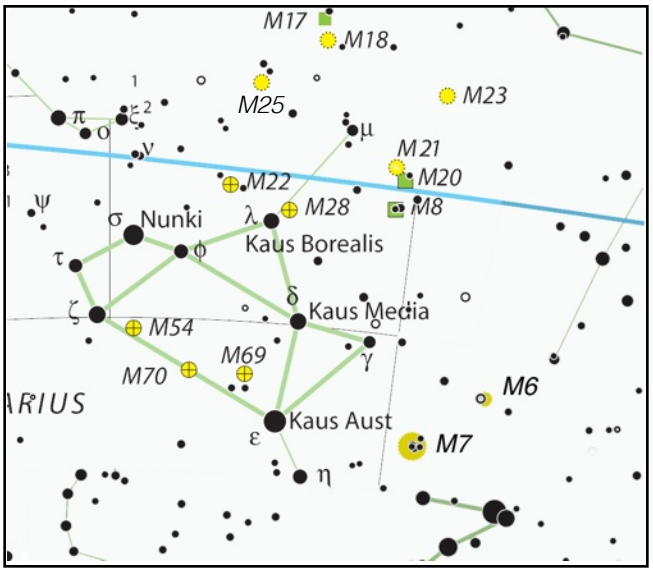
In my negative M27 image enlarged on the computer screen, I can just detect the hint, a faint wisp of a previous earlier ejection of stellar material. This encourages me to try longer exposures using larger apertures to better define these wispy features.

M20 is simply a wonderful and fascinating sight in medium to large aperture telescopes. It is called the Trifid Nebula because the three dark, and quite prominent dust lanes break the nebulosity into three lobes. M20 represents a birthplace for new stars. These hot young stars are easily seen in the first colour photo. Their intense radiation is scattered and reflected by the dust clouds and produces the red and blue colours picked up by my camera. In the negative photo the three dust lanes show up as white channels and the brilliant nebular stars show up as black circles. I find it easier to follow the convolutions of the meandering channels in my negative photo. [The bright "star" in the centre of M20 is actually a beautiful triple star! -ed]

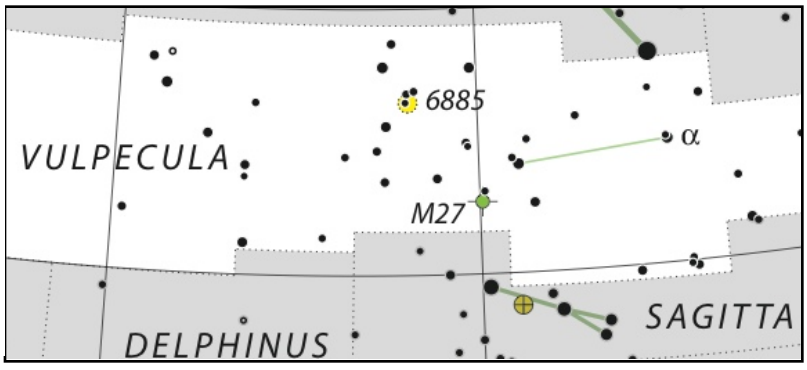
Just to close on a personal note. M27, associated with stellar death, and M20, associated with stellar birth, remind us that even the stars have finite lifespans. We are part of a changing, evolving Universe. This past year Paula and I have lost three wonderful friends, all to cancer. They all had families, and lived full, joyful lives. The best gift our parents gave us is consciousness, and the opportunity to participate in life's journey. As my wife says, Carpe Diem!

***Trifid Nebula, M20**: 2x3 min exposures ,3200 ISO, Canon 60Da, Tak TOA 150 mm, EM 400 Mount (Cunningham Image, March 17th, 2016)*
The Trifid Nebula in Sagittarius is 4100 ly away with a diameter of 30 ly.





Finder charts for M20 and M27: The region around M20, the Trifid, is rich in other nebula, open and globular clusters and double and multiple stars like the triple star (HN 40) in the very centre of M20. The IAU chart for the Teapot of Sagittarius shows a dozen Messier objects plus two more in Scorpius, the Butterfly (M6) and Ptolemy (M7) Clusters. By comparison, the region around the Dumbbell Nebula is sparse with only three objects shown. But M27 on its own is worth the view!



Jupiter Just Got Nailed by Something!

29 Mar , 2016 by Bob King Universe Today www.universetoday.com

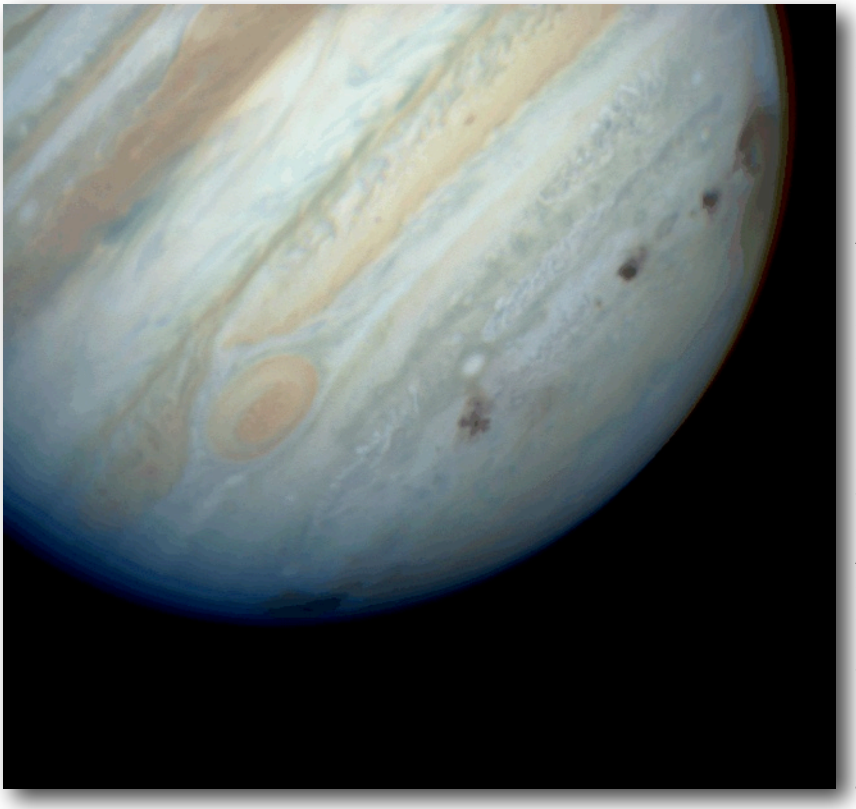
Jupiter may be the biggest planet, but it sure seems to get picked on. On March 17, amateur astronomer Gerrit Kernbauer of Mödling, Austria, a small town just south of Vienna, was filming Jupiter through his 7.8-inch (200mm) telescope. 10 days later he returned to process the videos and discovered a bright flash of light at Jupiter's limb.

"I was observing and filming Jupiter with my Skywatcher Newton 200 telescope, writes Kernbauer. "The seeing was not the best, so I hesitated to process the videos. Nevertheless, 10 days later I looked through the videos and I found this strange light spot that appeared for less than one second on the edge of the planetary disc. Thinking back to Shoemaker-Levy 9, my only explanation for this is an asteroid or comet that enters Jupiter's high atmosphere and burned up/exploded very fast."

The flash certainly looks genuine, plus we know this has happened at Jupiter before. Kernbauer mentions the **first-ever confirmed reported comet impact** that occurred in July 1994. Comet Shoemaker-Levy 9, shattered to pieces from strong tidal forces when it passed extremely close to the planet in 1992, returned two years later to collide with Jupiter — one fragment at a time. 21 separate fragments pelted the planet, leaving big, dark blotches in the cloud tops easily seen in small telescopes at the time.

Not long after Kernbauer got the word out, a second video came to light taken by John McKeon from near Dublin, Ireland using his 11-inch (28 cm) telescope. And get this. Both videos were taken in the same time frame, making it likely they captured a genuine impact.

Austrian amateur astronomer Gerrit Kernbauer recorded this brief flash of light at Jupiter's limb on March 17, 2016. It was confirmed by another amateur video observation made by John McKeon of Ireland. ***Credit: Gerrit Kernbauer***



Above: *Comet Shoemaker-Levy 9 broke up into many fragments which later slammed into Jupiter's southern hemisphere one after another to create a string of dark blotches in July 1994.* ***Credit: NASA/ESA***

With the advent of cheap video cameras, amateurs have kept a close eye on the planet, hoping to catch sight of more impacts. Two factors make Jupiter a great place to look for asteroid or comet collisions. First, the planet's strong gravitational influence is able to draw in more comets and asteroids than smaller planets. Second, its powerful gravity causes small objects to accelerate faster, increasing their impact energy.

According to *Bad Astronomy* blogger Phil Plait: "On average (and ignoring orbital velocity), an object will hit Jupiter with roughly five times the velocity it hits Earth, so the impact energy is 25 times as high." Simply put, it doesn't take something very big to create a big, bright bang when it slams into Jove's atmosphere.

It wasn't long before the next whacking. 15 years to be exact.On July 19, 2009, Australian amateur Anthony Wesley was the first to record a brand new **dark scar** near Jupiter's south pole using a low-light video camera on his telescope. Although no one saw or filmed the impact itself, there was no question that the brand new spot was evidence of the aftermath: NASA's Infrared Telescope Facility at Mauna Kea picked up a **bright spot** at the location in infrared light.Once we started looking closely, the impacts kept coming. Wesley hit a second home run on **June 3, 2010** with video of an impact flash, later confirmed on a second video made by Christopher Go. This was quickly followed by another flash filmed by Japanese amateur astronomer Masayuki Tachikawa on **August 20, 2010**.Prior to this month's event, amateur Dan Petersen visually observed a impact flash lasting 1-2 seconds in his 12-inch (30.5 cm) scope on **September 10, 2012**, which was also confirmed on webcam by George Hall.

Keep 'em comin'!

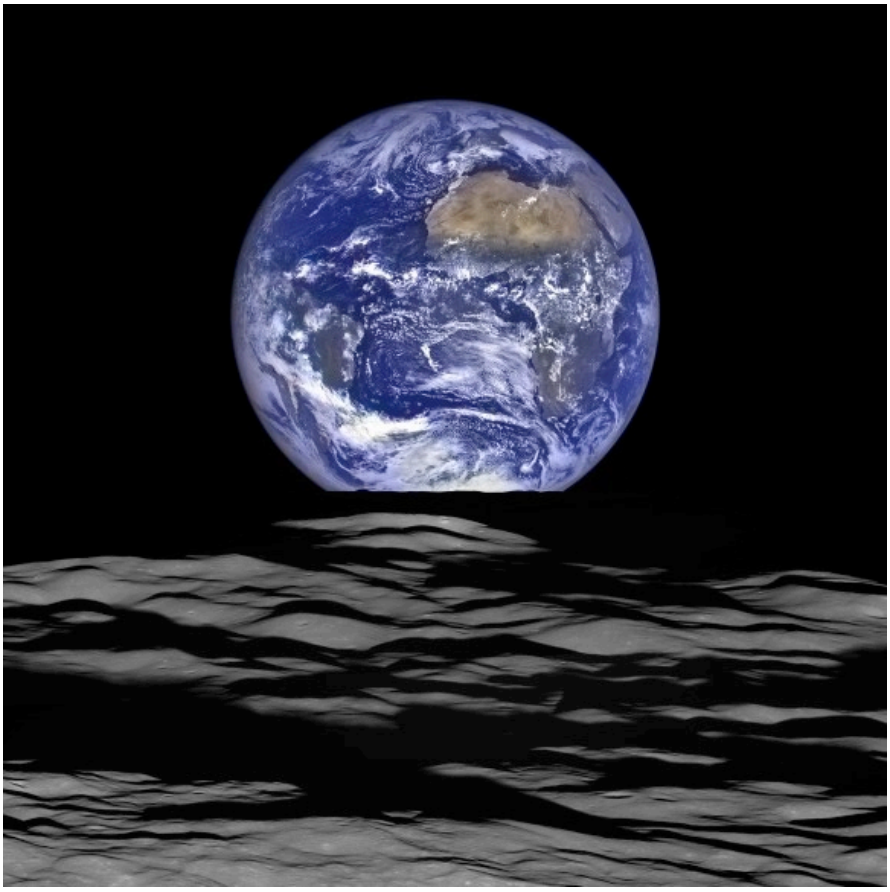
When Will Earth Lock to the Moon?

11 Apr , 2016 by Fraser Cain Universe Today www.universetoday.com

We always see the same side of the Moon. It's always up there, staring down at us with its terrifying visage. Or maybe it's a creepy rabbit? Anyway, it's always showing us the same face, and never any other part. This is because the Moon is tidally locked to the Earth; the same fate that affects every single large moon orbiting a planet. The Moon is locked to the Earth, the Jovian moons are locked to Jupiter, Titan is locked to Saturn, etc.

As the Moon orbits the Earth, it slowly rotates to keep the same hemisphere facing us. Its day is as long as its year. And standing on the surface of the Moon, you'd see the Earth in roughly the same spot in the sky. Forever and ever. We see this all across the Solar System.

But there's one place where this tidal locking goes to the next level: the dwarf planet Pluto and its large moon Charon are tidally locked to each other. In other words, the same hemisphere of Pluto always faces Charon and vice versa.



Because of tidal locking, you'd see Earth in roughly the same spot from the Moon forever. For-EH-VER. ***Credit: NASA / Goddard / Arizona SU***

It take Pluto about 6 and a half days for the Sun to return to the same point in the sky, which is the same time it takes Charon to complete an orbit, which is the same time it takes the Sun to pass through the sky on Charon. Since Pluto eventually locked to its moon, can the same thing happen here on Earth. Will we eventually lock with the Moon?

Before we answer this question, let's explain what's going on here. Although the Earth and the Moon are spheres, they actually have a little variation. The gravity pulling on each world creates love handle tidal bulges on each world. And these bulges act like a brake, slowing down the rotation of the world. Because the Earth has 81 times the mass of the Moon, it was the dominant force in this interaction. In the early Solar System, both the Earth and the Moon rotated independently. But the Earth's gravity grabbed onto those love handles and slowed down the rotation of the Moon. To compensate for the loss of momentum in the system, the Moon drifted away from the Earth to its current position, about 370,000 kilometers away.

But Moon has the same impact on the Earth. The same tidal forces that cause the tides on Earth are slowing down the Earth's rotation bit by bit. And the Moon is continuing to drift away a few centimeters a year to compensate. It's hard to estimate exactly when, but over the course of tens of billions of years, the Earth will become locked to the Moon, just like Pluto and Charon. Of course, this will be long after the Sun has died as a red giant. And there's no way to know what kind of mayhem that'll cause to the Earth-Moon system. Other planets in the Solar System may shift around, and maybe even eject the Earth into space, taking the Moon with it.

What about the Sun? Is it possible for the Earth to eventually lock gravitationally to the Sun? Astronomers have found extrasolar planets orbiting other stars which are tidally locked. But they're extremely close, well within the orbit of Mercury. Here in our Solar System, we're just too far away from the Sun for the Earth to lock to it. The gravitational influence of the other planets like Venus, Mars and Jupiter perturb our orbit and keep us from ever locking. Without any other planets in the Solar System, though, and with a Sun that would last forever, it would be an inevitability.

It is theoretically possible that the Earth will tidally lock to the Moon in about 50 billion years or so. Assuming the Earth and Moon weren't consumed during the Sun's red giant phase. I guess we'll have to wait and see.

Pluto and Charon are tidally locked to each other. ***Credit: NASA / JHUAPL / SwRI***

SGN Featured Constellations: Hydra, Corvus, Crater and Sextans

Hydra (Sea Serpent)

α–Hydrae - Alphard

Hydra is a long constellation stretching over 100° through the heavens. It is rather difficult to identify because its stars are rather faint, with the exception of Alphard, a 2nd magnitude star. Alphard, also known as Cor Hydrae, the "Dragon's Heart", is a red star and the only bright star in the area. It forms a fat isosceles triangle with Regulus and Denebola in Leo. The head of Hydra, a beautiful compact grouping of stars, lies directly south of the Bee-Hive cluster in Cancer.

DOUBLE STARS

	Mag.	Sep'n (s)	Location	Remarks
ε	3.8-7.8	4	084407	Yellow-Blue
54	5.2-7.1	9	144325	Red-Blue (not on this chart)
Hh 376	5.8-5.9	9	113029	

MESSIER OBJECTS

	Mag	Location	Remarks
M48	--	081202	Open Cluster.
M68	--	123726	Globular Cluster.
M83	10.1	133430	Sp. Galaxy. [S. Pinwheel Galaxy -ed]

Other Objects of Interest

NGC2548 -A large open cluster with one fine double and many stars of approximately 9th magnitude. Location: 081205

NGC3242 - A very large unusual planetary nebula, seen as a pale blue disc. It is shown to be a ring nebula at high power. Location 102317. ["The Ghost of Jupiter" planetary -ed]

R Cancri - Long period (406 days) variable, mag range 3.5-10; visible to the naked eye at maximum. Location 132713.

[Note: Hydra is the female water snake. There is another constellation called Hydrus, which is a male water snake found in the southern sky between the Large Magellanic Cloud and the star Achernar. Hydrus, like many of the other small southern constellations has only a few bright stars. The northern water snake, Hydra is also devoid of bright stars but it stretches from about 8 H to 15 H in RA, a span of 100° or 1/4 of the sky!-ed]

Corvus (Crow)

α Corvi-Alchiba γ Corvi-Gienah δ Corvi -Algorab

Corvus is a conspicuous constellation, its 3rd and 4th magnitude stars forming a distinctive trapezoidal figure perched on the coils of Hydra. δ Corvi lies about 10° SW of Spica in Virgo. γ and δ Corvi lie on a straight line with Spica. The variable star R Corvi can be seen with fieldglasses when at its maximum magnitude of 5.

DOUBLE STARS

	Mag.	Sep'n (s)	Location	Remarks
δ	3.1-9.2	24	122716	Yellow-Lilac; fine contrast; easy
ζ	5.3-13.8	8	121822	
Σ1669	6.0-6.1	6	123913	A fine pair.

Other Objects of Interest

NGC4361 - Planetary nebula. Location: 122119

R Corvi - Long per (317 days) var, mag range 5 -14; Location 121719

Crater (Cup)

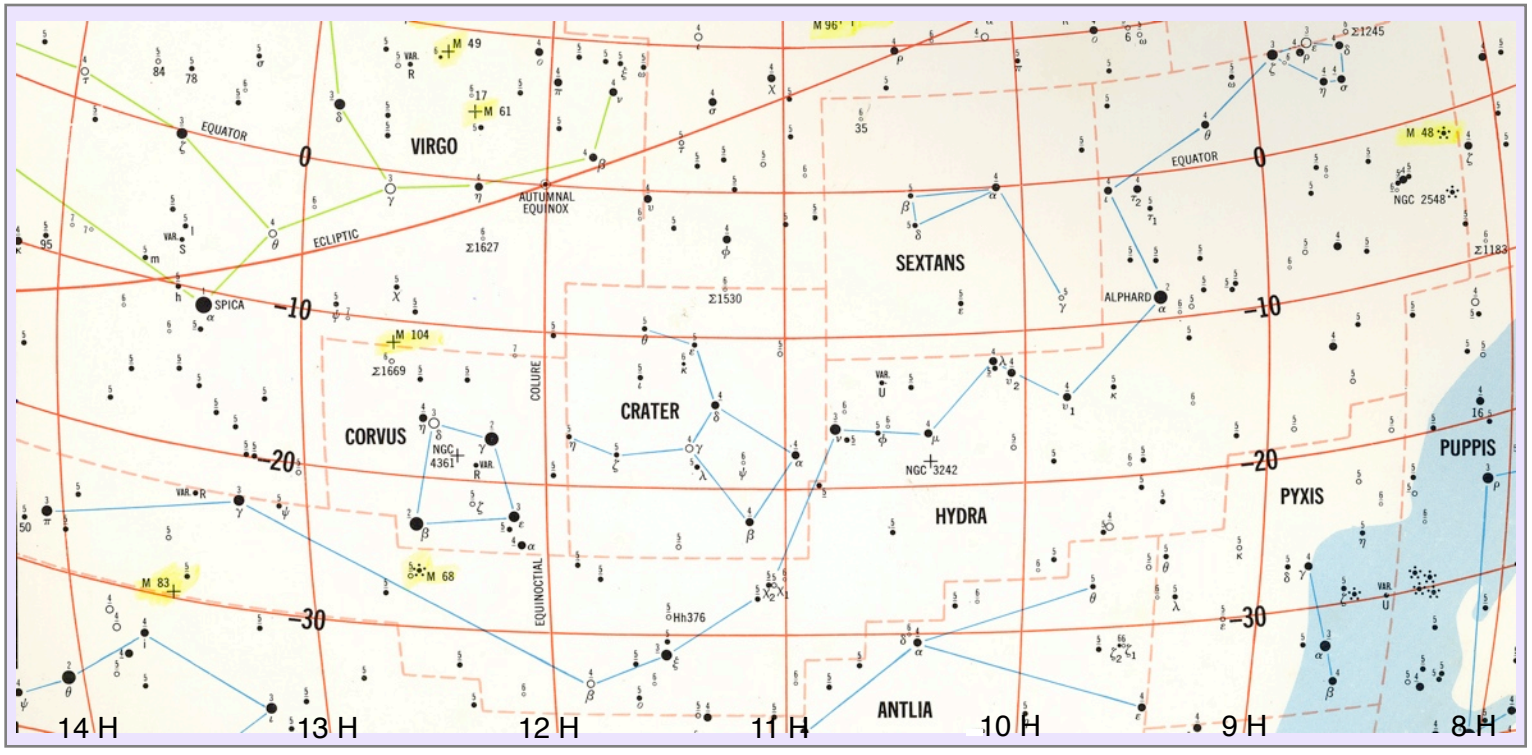
Crater is east of Corvus and about 30° due south of Denebola in Leo. It is a fairly inconspicuous constellation but can be easily distinguished on a clear, dark night. Its stars form a quite recognizable goblet-shaped figure. Σ1530 is a double star magnitudes 6.8-8.2, separation 8", location 111407

Sextans (Sextant)

Sextans is a small constellation of very faint stars; the brightest, α–Sextantis, has a magnitude of 4.5 and lies about 12° south of Regulus, in Leo. Observe the double star 35 Sextantis, magnitude 6.3-7.4, separation 6". [There is also a faint third companion of 8.1 magnitude at 334 s separation in PA 210° -ed]

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.



May	**4**	**Wed**	**19:00**	**Regular Meeting Tom Thomson AG** Beginner's Forum, Public Welcome
			13:45	Eta Aquarid Meteor Shower: ZHR = 60
	5	Thu	23:14	Moon at Perigee: 357 827 km
	6	Fri	14:30	**NM** rises locally at 6:19 am DST
	7	**Sat**	**@dark**	**Fox Dark of Moon Viewing night BAS members and Guests**
	8	**Sun**	**03:21**	**Aldebaran 0.5° S of Moon** Occultation not visible locally
	9	**Mon**	**10:10**	**Mercury Inferior Conj. Transit of Mercury!** 7:12 am - 2:42 pm DST, Observing at Fox starts 7 am
	13	Fri	12:02	**FQ Moon** rises 12:49 pm DST
	14	Sat	02:06	Regulus 2.5° N of Moon
	15	Sun	04:30	Jupiter 2.2° N of Moon
	18	Wed	09:07	Spica 5.7° S of Moon
			17:06	Moon at Apogee: 405 933 km
	21	Sat	16:15	**Full Moon** rises at 8:37 pm DST (Smallest in 2016)
	22	**Sun**	**06:15**	**Mars at Opposition (magnitude -2.0) 18.3" of arc diameter.**
			16:59	Saturn 3.5° S of Moon
	29	Sun	07:12	**LQ Moon** rises locally at 1:56 am DST

BAS Events

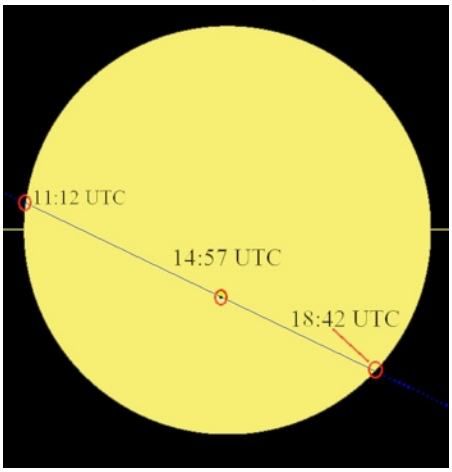
May	**4**	**Wed**	**19:00**	**Regular Meeting Tom Thomson AG** Beginner's Forum, Public Welcome
	7	**Sat**	**@dark**	**Fox Dark of Moon Viewing night BAS members and Guests**
May 9 to 15 ASTRONOMY WEEK				
	9	Mon	10:10	Mercury Inferior Conj. **Transit of Mercury!** 7:13 am - 2:39 pm DST, Observing at Fox (Public event)
	14	Sat		**Astronomy Day** public viewing @Fox

May 19-23 AstroCATS London ON. Info here: www.astrocats.ca

Special Events

Mercury Transits Sun May 9

Mercury and Venus are the only planets that can cross in front of the Sun since they are the only ones closer than Earth. Venus transits occur every 125 years or so (next one is in 2117) but Mercury crosses the Sun more often. Since 1900, there have been 16. The May 9 transit is the third of the current century and will be followed by 11 more.



If you miss the May 9th transit, try again Nov 11, 2019 or Nov 13, 2032.

Mercury should appear on the Sun starting at 7:12 am May 9 and disappear at 2:42 pm, taking 7.5 hours to cross the entire disk. It's diameter of 12 arc-seconds is much smaller than Venus which is almost 5 times larger when it transits the Sun. Mercury will appear as a small round "sunspot" and take only 3 minutes to cross the limb of the Sun at ingress and egress so viewing the "black drop" effect will be much harder.

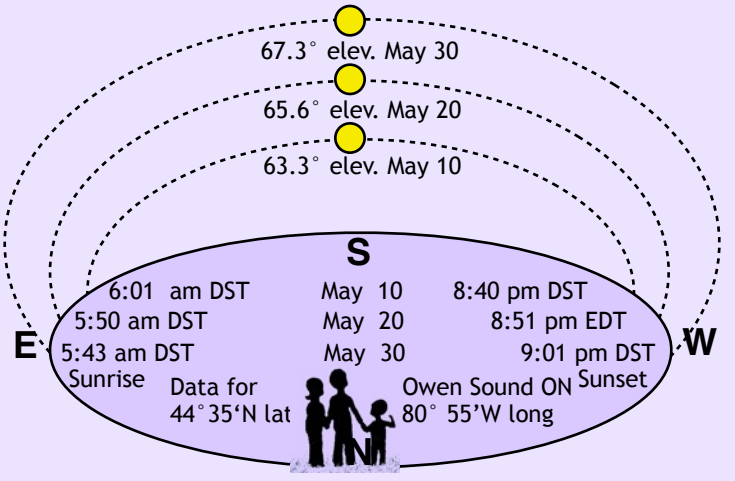
Of course, the Sun MUST be properly filtered and a telescope used for the best views. Mercury is too small to be seen in any but high-power binos -12 x 70s might work but cover both objectives lenses. BAS is selling Baader solar filter sheets -contact John H. Observing at the Fox starts at 7 am using the H-alpha scope and the Mallincam.

Planets

MERCURY is crossing in front of the Sun this month and transits the solar disk May 9 (see Special Events below for details).

VENUS, (-3.9) is too close to the Sun to see in dark sky but a daytime appulse happens with Mercury on May 14 (1.2° separation). Venus is behind the Sun in early June. **MARS,** (mag. -2.0, its brightest this year) rises with Saturn (in Scorpius) before midnight and is at opposition on May 22. It retrogrades towards Dschubba (δ-Sco) and is less than a degree away May 20. **JUPITER**, (-2.2) is 50° high in the SW by sunset and is well placed in dark evening skies setting about 2 am. **SATURN,** (mag. 0.1) rises just after Mars and stays less than 15° from Mars all month. **URANUS,** (5.8) and **NEPTUNE,** (7.9) are morning planets with Neptune rising 2 am followed by Uranus 1.5 h later. **Dwarf planet**, **Ceres (8.6)** rises about the same time as Uranus but both are in morning twilight this month. **Asteroid, Vesta (6.7)** is too near the Sun to view this month. **PLUTO** (mag. 14) rises around midnight with Sagittarius and is visible in dark sky at its meridian transit time about 3 am. Charts for these planets/asteroids for 2016 are now on the BAS website.

The diagram below gives the sunrise/sunset times and the Sun's altitude for May. The moon phase graphic at the bottom of this page shows the lunar phase for each night of the month. Times of moonrise for NM, FQ, FM and LQ for Owen Sound are in the Sky Calendar listing at left. The May 8 Aldebaran occultation is not visible locally. See Special Events for details of the Mercury Transit. We get one more in 2019 and then no transits of Mercury until 2032!



May 2016

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

By permission Univ. of Texas McDonald Obs.

BAS Member Loaner Scopes

Solar H-alpha scope now available.

Our Lunt solar scope can be borrowed by BAS members Contact Brett or John to get your hands on it. We now have a suitable mount for it as well or you can use your own. A short training session will be provided on pickup.

Several Dobs available.

One 12-inch dobsonian loaner telescope is available for free loan to members. Smaller 8-inchers are also available. Contact John H. or Brett T. for availability. Scopes come in and out so keep checking with John or Brett if you are interested in a loaner.

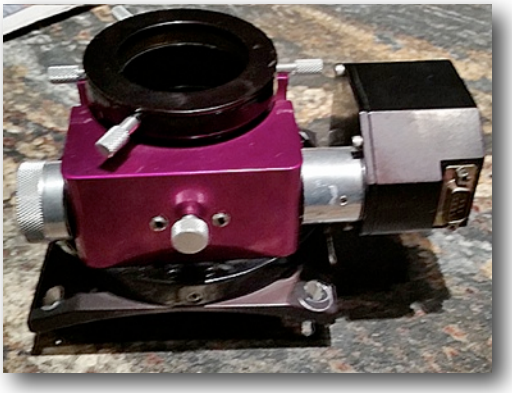
S G N Classified Ads Section

(Now also on our website)

Pluto Explored! In 2006, NASA placed a 29-cent 1991 'Pluto: Not Yet Explored' stamp in the New Horizons spacecraft. In 2015 the spacecraft carried the stamp on its history-making mission to Pluto and beyond. With this stamp, the Postal Service recognizes the first reconnaissance of Pluto in 2015 by NASA's New Horizon mission. The souvenir sheet of four stamps contains two new stamps appearing twice. The first stamp shows an artists' rendering of the New Horizons spacecraft and the second shows the spacecraft's enhanced color image of Pluto taken near closest approach.
Credits: USPS/Antonio Alcalá © 2016 USPS

The Postal Service also released a preview of its new 2016 stamps, which include the Pluto and the New Horizons spacecraft stamps (right), eight new colorful Forever stamps of NASA images of solar system planets, a Global Forever stamp dedicated to Earth's moon as well as another postal treat for space fans: a tribute to 50 years of *Star Trek.*

FOR SALE: Moonlite CRL 2.5 inch Large Format **Crayford Newtonian Focuser** ($592.10 new -see https://focuser.com/products.php) with Hi-Res Stepper Motor ($252.81 new). Flange for 14" tube, accepts 2" accessories (EP/camera). This is a **true Crayford focuser**, not the cheap "Crayford-style" knock-off. Not set up for manual focusing, requires hand paddle ($330 not included) for manual operation and computer control for remote focusing. This is meant for a remote imaging setup and comes from an abandoned project (12" scope). Over $850 plus taxes and shipping new.
Asking $600.00. Contact **Paul** at ski@bmts.com



From page 1:

Marvin the Martian's dog's name is Commander K-9. definitely not Pluto -->

FOR SALE:

Celestron AVX mount. Includes GOTO hand controller, tripod and two 10 pound counterweights. OTA capacity 30 pounds. Reviews at http://joebergeron.com/avx.htm
New $880, asking $650.00.
Contact **John H.**
at stargazerjohn@rogers.com