Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 11 No.10 October 2017

October 2017 SGN Contents

Cassini Mission at Saturn is Over

A screen shot from the simulation video provided by NASA/JPL describes the demise of Cassini showing it breaking up and vapourizing in the Saturnian atmosphere. The final moments were recorded over the X and S band channels at approximately 7:55 am EDT when the Canberra Deep Space Antenna lost its signal with the spacecraft. More about the Grand Finale on pg 7 and 8.

A "Goofy" Eclipse

The stamp left was one of the more interesting ones I came across on a stamp website and shows the classic reference to Mark Twain's story about how an eclipse saved the "Connecticut Yankee in King Arthur's Court". The characters shown here are Goofy as the Yankee and Mickey Mouse as Merlin, the wizard being astounded by the Yankee's "power" over the Sun. There was, in fact, a Disney animated version of the Twain story in 1970(?) and in 1985 Romania commemorated the 150th anniversary of Twain's birth by issuing this unique stamp. More about eclipse stamps can be found on page 9 in this issue.

Astronomy Events October

Times in 24 hr format unless otherwise noted

Oct 05 Thu 19:00 Venus 0.2° N of Mars (16 min. separation shrinking to 12.5 min.)
08 Sun 17:00 Mercury at Superior Conjunction (not visible)
09 Mon 01:51 Moon at Perigee: 366 858 km
09 Mon 14:05 Aldebaran 0.6°S of Moon
13 Fri 16:29 Beehive 3.0°N of Moon
15 Sun 06:54 Regulus 0.2°S of Moon (occ.5:48 am EDT to 6:30 am -early Sunday morning event)
17 Tue 06:04 Mars 1.8°S of Moon
17 Tue 20:21 Venus 2.0°S of Moon
19 Thu 13:00 Uranus at Opposition
21 Sat 07:00 Orionid Meteor Shower (20/h) Moon 3% !!
24 Tue 07:54 Saturn 3.3°S of Moon
24 Tue 22:25 Moon at Apogee: 405 151 km
26 Thu 14:00 Jupiter in Conjunction with Sun (not visible)

Moon phases: FM Oct 05; **LQ** 12; **NM** 19; **FQ** 27

BAS Club Events in October

BAS meetings are at the Tom Thomson Art Gallery for the rest of 2017. Check www.bluewaterastronomy.com for BAS event details.

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

Oct 04 Wed 19:00 BAS meets at TTAG: Movie Night

21 Sat BAS Dark of Moon viewing (Orionid meteor shower 06:00 peak (view Fri night / Sat am and Sat night/Sun am, max. 20/hour, NM. **Public viewing on Oct 21 only. Observing at Fox Obs. starts at dark weather permitting.**

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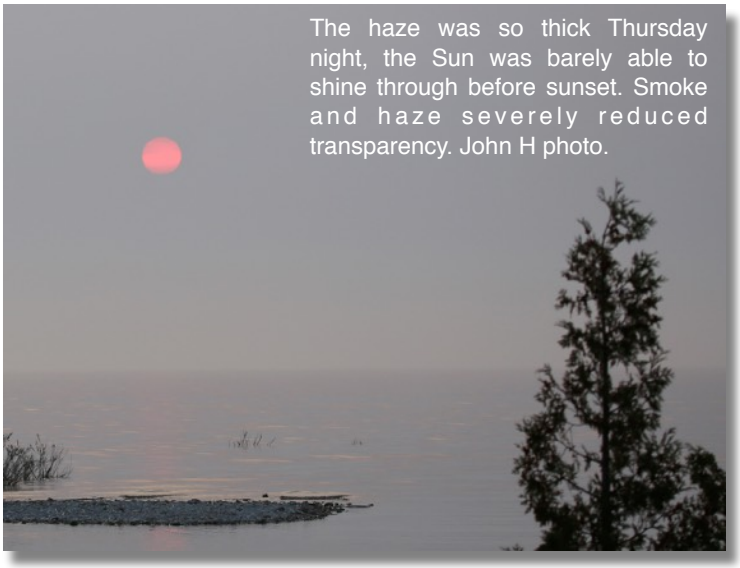
Inverhuron Dark Sky Weekend

BAS was well represented at the Inverhuron Prov. Park Sep 15 and 16. Five members camped overnight and shared views through their telescopes of the planets Jupiter and Saturn as well as deep sky objects like the Hercules Cluster, Andromeda Galaxy and the Borg Cube. One night was passable (Friday night was a 6.5 out of 10) while Saturday was less clear. On Saturday, constellations were just recognizable, the Milky Way was just barely detectable and M31 was not visible to the naked eye. Still this was much better than Thursday (image below).

On Thursday, only Saturn, Arcturus, Vega, Deneb and Altair were visible through the murk. It was likely due to the pall of high altitude smoke from forest fires out west. A website www.firesmoke.ca shows the trails of forest fire smoke over Canada and indicated that fire ash and smoke had been blown as far east as Newfoundland in the days before our camping weekend. I suspect we were lucky to get the one reasonable night and a second so-so night during our stay.



The haze was so thick Thursday night, the Sun was barely able to shine through before sunset. Smoke and haze severely reduced transparency. John H photo.

Above: The "Red Light Gang" consisted of (L to R) Brett Tatton, Lorraine Rodgers, Susan Maclachlin, Doug Turner, new member Devin Glew and John Hlynialuk.

Image left: In spite of the up and down sky transparency, the view from our campsite straight up Friday night was not bad (image left) and even shows a bit of auroral activity as a pale reddish glow lower centre. Almost a dozen aurora alerts were issued while we were camped but nothing really obvious developed at our latitude. Images on this page by John H. Milky Way image left was taken with Canon 6D, 12 mm Samyang wide angle lens, f/3.5, ISO 4000, 30s exposure on a tripod. Enhanced in PS to bring out the little bit of aurora there was.

Large Sunspot Group Appears and Erupts -Twice!

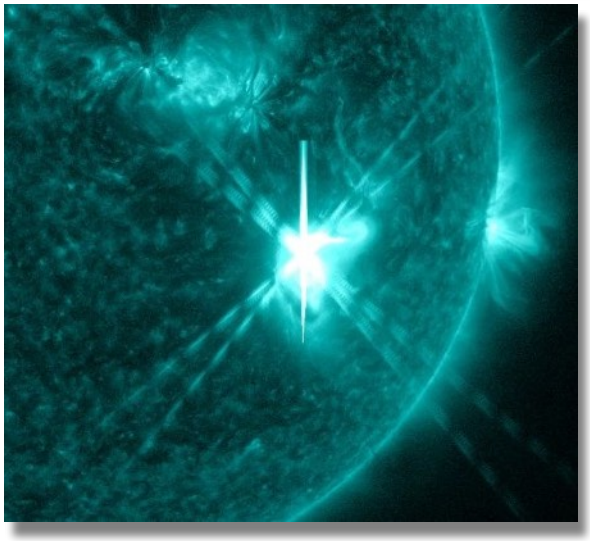
The large irregular group of sunspots at right (AR 2673) has now gone around behind the Sun but during its progress across the visible disk from Aug 30 to Sep 10, it erupted twice with an X-9.3 flare on Sep 6 and again on Sep 10 with an X-8 class flare. The first produced extensive auroral displays in both northern and southern hemispheres for several nights. Unhappily for local aurora watchers, it was cloudy both nights of the best displays but Julian Delf did manage to get an image on Sep 7 (below) just before it clouded over. Photo right by John H. through Celestron C-9.25 Edge HD. Exposure 1/640 s at ISO 200, foc. len. 2350 mm f/10.

Numerous alerts were issued by spaceweather.com and auroras were seen as far south as Arkansas by one report. Local observers were clouded out after a hint of the display presented itself around 9:30 pm Sep 7. Only Julian D. got an image just ahead of clouds that night, all I got was a faint green glow in behind the clouds which blotted out everything to the north and northwest from 9:30 pm on.

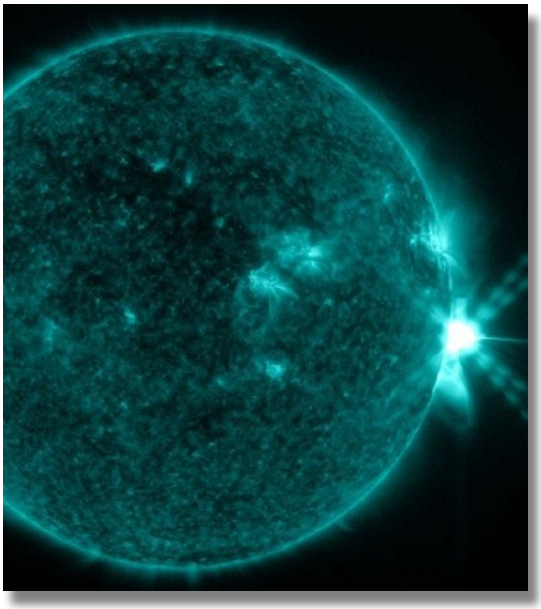
Photo left by Julian Delf, Sony SLT-A77V camera 15s exposure at f/2.8, ISO 800, focal length 16mm.

On Sep 6 at 1202 UT an X-9.3 flare exploded on the Sun from sunspot group AR 2673. X-rays and UV radiation from the blast ionized the top of Earth's atmosphere, causing a strong shortwave radio blackout over Europe, Africa and the Atlantic Ocean. Auroral displays were reported from as far south as Arkansas in the northern hemisphere and extensive displays were seen in the southern hemisphere as well.

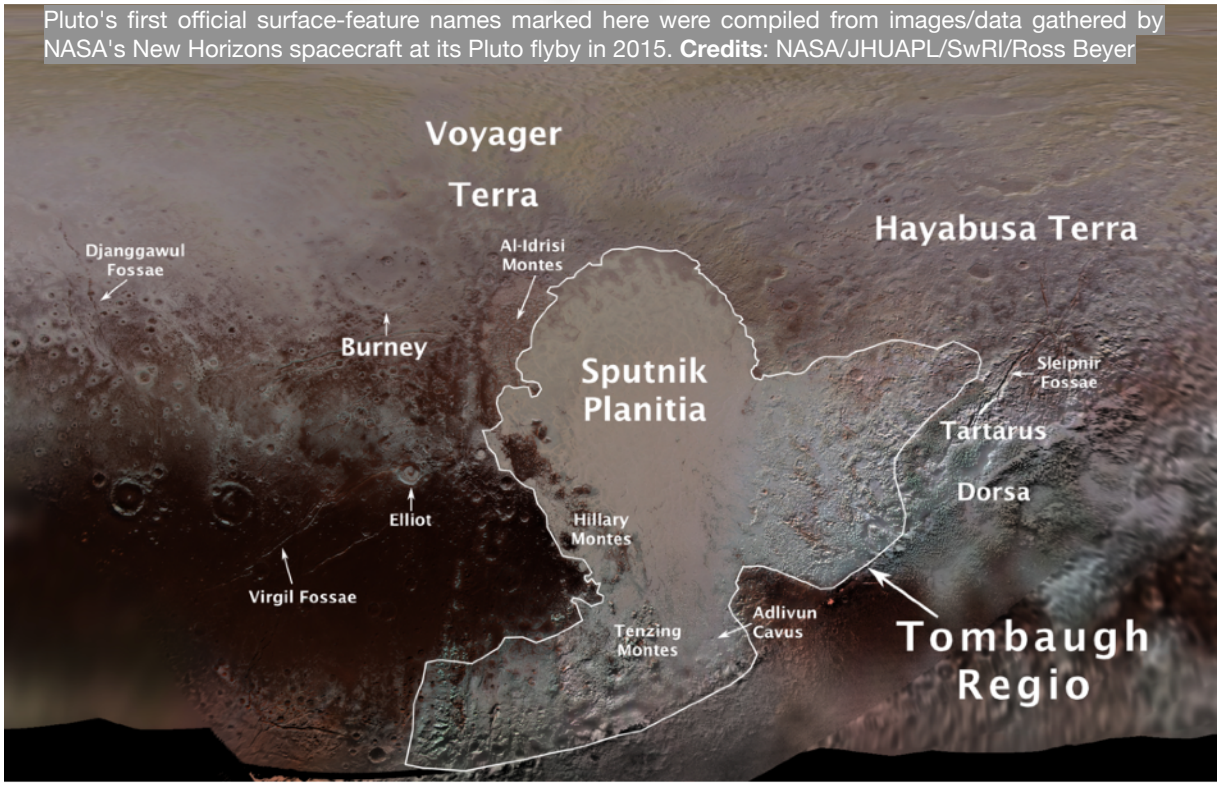
Then again on Sep 10 at 1606 UT another flare only slightly less energetic at X-8 once more erupted and once again disrupted radio communications. X-ray images right were taken by the Solar Dynamics Observatory.



Auroral displays were seen again as a result and during the Inverhuron Dark Sky weekend Sep 14 to 17, there were 8 more alerts. No extensive bright aurora were seen locally however.



Pluto Features Named



Pluto's first official surface-feature names marked here were compiled from images/data gathered by NASA's New Horizons spacecraft at its Pluto flyby in 2015. **Credits**: NASA/JHUAPL/SwRI/Ross Beyer

NASA/JPL Sep 7, 2017
It's official: Pluto's "heart" now bears the name of pioneering American astronomer Clyde Tombaugh, who discovered Pluto in 1930. And a crater on Pluto is now officially named after Venetia Burney, the British schoolgirl who in 1930 suggested the name "Pluto," Roman god of the underworld, for Tombaugh's newly-discovered planet.

Tombaugh Regio and Burney crater are among the first set of official Pluto feature names approved by the International Astronomical Union (IAU), the internationally recognized authority for naming celestial bodies and their surface features.

These and other names were proposed by NASA's New Horizons team following the first reconnaissance of Pluto and its moons by the New Horizons spacecraft in 2015.

A total of 14 Pluto place names have now been made official by the IAU; many more will soon be proposed to the IAU, both on Pluto and on its moons. "The approved designations honor many people and space missions who paved the way for the historic exploration of Pluto and the Kuiper Belt, the farthest worlds ever explored," said Alan Stern, New Horizons principal investigator from Southwest Research Institute, Boulder, Colorado.

"We're very excited to approve names recognizing people of significance to Pluto and the pursuit of exploration as well as the mythology of the underworld. These names highlight the importance of pushing to the frontiers of discovery," said Rita Schulz, chair of the IAU Working Group for Planetary System Nomenclature.

The team gathered many ideas during the "Our Pluto" online naming campaign in 2015. Following on Venetia Burney's original suggestion, several place names on Pluto come from underworld mythology. "I'm delighted that most of the approved names were originally recommended by members of the public," said Showalter, of the SETI Institute, Mountain View, California.

The approved Pluto surface feature names are listed below. The names pay homage to the underworld mythology, pioneering space missions, historic pioneers who crossed new horizons in exploration, and scientists and engineers associated with Pluto and the Kuiper Belt.

Tombaugh Regio honors Clyde Tombaugh (1906–1997), who discovered Pluto in 1930 from Lowell Observatory in Arizona.

Burney crater honors Venetia Burney (1918-2009), who at age 11 suggested the name "Pluto" for Tombaugh's newly discovered planet. Later in life she taught mathematics and economics.

Sputnik Planitia is a large plain named for Sputnik 1, the first space satellite, launched by the Soviet Union in 1957.

Tenzing Montes and **Hillary Montes** are mountain ranges honoring Tenzing Norgay (1914–1986) and Sir Edmund Hillary (1919–2008), the Indian/Nepali Sherpa and New Zealand mountaineer were the first to reach the summit of Mount Everest and return safely.

Al-Idrisi Montes honors Ash-Sharif al-Idrisi (1100–1165/66), a noted Arab mapmaker and geographer whose landmark work of medieval geography is sometimes translated as "The Pleasure of Him Who Longs to Cross the Horizons."

Djanggawul Fossae defines a network of long, narrow depressions named for the Djanggawuls, three ancestral beings in indigenous Australian mythology who traveled between the island of the dead and Australia, creating the landscape and filling it with vegetation.

Sleipnir Fossa is named for the powerful, eight-legged horse of Norse mythology that carried the god Odin into the underworld.

Virgil Fossae honors Virgil, one of the greatest Roman poets and Dante's fictional guide through hell and purgatory in the Divine Comedy.

Adlivun Cavus is a deep depression named for Adlivun, the underworld in Inuit mythology.

Hayabusa Terra is a large land mass saluting the Japanese spacecraft and mission (2003-2010) that performed the first asteroid sample return.

Voyager Terra honors the pair of NASA spacecraft, launched in 1977, that performed the first "grand tour" of all four giant planets. The Voyager spacecraft are now probing the boundary between the Sun and interstellar space.

Tartarus Dorsa is a ridge named for Tartarus, the deepest, darkest pit of the underworld in Greek mythology.

Elliot crater recognizes James Elliot (1943-2011), an MIT researcher who pioneered the use of stellar occultations to study the solar system – leading to discoveries such as the rings of Uranus and the first detection of Pluto's thin atmosphere.

The New Horizons spacecraft is speeding toward its next flyby, the ancient Kuiper Belt object 2014 MU69, a billion miles beyond Pluto, on Jan. 1, 2019.

More here: https://www.nasa.gov/feature/hibernation-over-new-horizons-continues-its-kuiper-belt-cruise

Hubble Spots Unique Object in Asteroid Belt

24 Sep , 2017
by Matt Williams (Universe Today)


Hubble time lapse video of 288P can be found here: https://youtu.be/yq2RjFqaztM

An interesting Hubble discovery has been made by a team of international astronomers led by the Max Planck Institute for Solar System Research. A unique object in the Main Asteroid Belt – a binary asteroid known as 288P – also behaves like a comet. According to the team's study, this binary asteroid experiences sublimation as it nears the Sun, which causes comet-like tails to form.

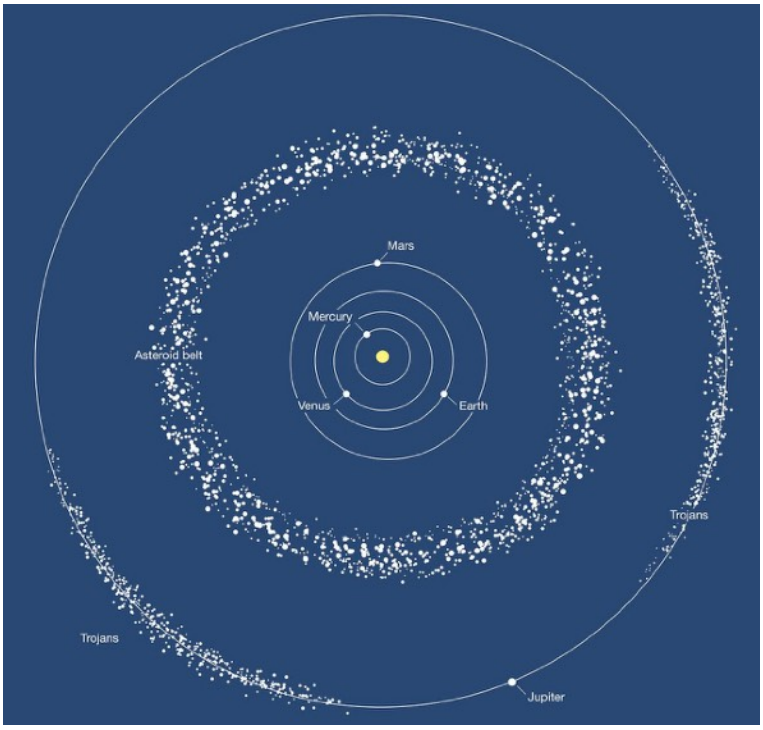
The study, titled "A Binary Main-Belt Comet", recently appeared in the scientific journal *Nature*. The team was led by Jessica Agarwal of the Max Planck Institute for Solar System Research, and included members from the Space Telescope Science Institute, the Lunar and Planetary Laboratory at the University of Arizona, the Johns Hopkins University Applied Physics Laboratory (JHUAPL), and the University of California at Los Angeles.

Using Hubble, the team first observed 288P in Sep 2016, when it was making its closest approach to Earth. Their images revealed that this object was not a single asteroid, but two of similar size and mass that orbit each other at a distance of about 100 km. Beyond that, the team also noted some ongoing activity in the binary system that was unexpected.

As Jessica Agarwal explained in a Hubble press statement, this makes 288P the first known binary asteroid that is also classified as a main-belt comet. "We detected strong indications of the sublimation of water ice due to the increased solar heating – similar to how the tail of a comet is created," she said. These surprising findings are also highly significant when it comes to the study of the Solar System.

Since only a few objects of this type are known, 288P is an extremely important target for future asteroid studies. The various features of 288P also make it unique among the few known wide asteroid binaries in the Solar System. Basically, other binary asteroids that have been observed orbited closer together, were different in size and mass, had less eccentric orbits, and did not form comet-like tails.

Two asteroid "belts" exist, Main Belt and Trojans



Credit: ESA/Hubble, M. Kornmesser

The observed activity of 288P also revealed a great deal about the binary asteroids past. The team concluded that 288P has existed as a binary system for the past 5000 years and must have accumulated ice since the earliest periods of the Solar System. As Agarwal explained:
"Surface ice cannot survive in the asteroid belt for the age of the Solar System but can be protected for billions of years by a refractory dust mantle, only a few meters thick… The most probable formation scenario of 288P is a breakup due to fast rotation. After that, the two fragments may have been moved further apart by sublimation torques."

Naturally, there are many unresolved questions about 288P, most of which stem from its unique behavior. Given that it is so different from other binary asteroids, scientists are forced to wonder if it merely coincidental that it presents such unique properties. And given that it was found largely by chance, it is unlikely that any other binaries that have similar properties will be found anytime soon.

"We need more theoretical and observational work, as well as more objects similar to 288P, to find an answer to this question," said Agarwal. In the meantime, this unique binary asteroid is sure to provide astronomers with many interesting opportunities to study the origin and evolution of asteroids orbiting between Mars and Jupiter.

In particular, the study of those asteroids that show comet-like activity (aka. main-belt comets) is crucial to our understanding of how the Solar System formed and evolved. According to contrasting theories of its formation, the Asteroid Belt is either populated by planetesimals that failed to become a planet, or began empty and gradually filled with planetesimals over time.

In either case, studying its current population can tell us much about how the planets formed billions of years ago, and how water was distributed throughout the Solar System afterwards. This, in turn, is crucial to determining how and where life began to emerge on Earth, and perhaps elsewhere!

Be sure to check out this animation of the 288P binary asteroid too, courtesy of the ESA and Hubble: https://youtu.be/7uQycqLkyK0

The Kearney Adventure

By Phil Visser

As part of the great eclipse trip to Grand Island Nebraska, our intrepid leader had contacted a faculty member at the University of Nebraska in Kearney. The early emails had made arrangements for a tour/viewing of the planetarium at the campus. Closer to the date of the eclipse, the lines of communication between John and his contact broke down, and so the plan for the planetarium visit was in doubt. Despite the uncertainty, five members of the BAS and two fellow astronomers from New Brunswick drove to Kearney in the hopes of a tour.

It wasn't very difficult to find the campus since the streets in Kearney are in a numbered grid much like Owen Sound. Thus without GPS, we found the campus and even found a parking spot near the planetarium. John H's fear that the planetarium show wasn't going to be a reality proved correct, but then serendipity found us! The 2 o'clock planetarium viewing coincided with a "Preclipse Panel" discussion in the Fine Arts Building. After a very short walk, we found ourselves in the theatre, with some 300 other interested members of the public.

We entered the theatre just as **Dr Adam Jensen** began the first presentation called **"Understanding Other Worlds."** He readily admitted that this discussion was "not about tomorrows eclipse" but did kind of relate to eclipses of another sort. He explained that astronomers and physicists have six ways of determining planets orbiting other stars. While speaking about three of the six ways, he revealed that instrumentation measures the brightness (magnitude) of the stars and can record minute variations in their magnitudes. These variations are measured for how great a reduction in the magnitude is, which then allows an estimate to be made about the planet size. With continued observation, when the same magnitude variation is repeated, the astronomers can then determine the orbital period and therefore the distance the planet is away from the host star.

From this point on, the order of speakers may be mixed up, but another speaker (**James Rohrer**) spoke about "**Religious Responses to Eclipses across time and cultures."** Several examples were given about oral history of eclipses in various cultures, from the Middle East, to Asia (China) and the Inca/Mayan culture. Dr Rohrer then delved into the some religious events from the Bible, including options for the Star of Bethlehem, to the period of darkness during the crucifixion. Several possible explanations about the Star of Bethlehem included a super nova, the planetary retrograde motion of either one or two superior planets. Nothing really fitted the timelines from history, but was interesting thoughts to consider. Also, the 6 hour period of "darkness" at the crucifixion could not be explained by an eclipse since totality lasts only a few minutes, at most.

Dr Doug Biggs spoke about "**Eclipses throughout History."** Clearly self confident in his presentation, the essence of his talk was simply that nobody in history really was able to predict eclipses before recent times. I respectfully suggest that the honourable doctor do some further research and perhaps review the book "Eclipse; The celestial phenomenon which has changed the course of history" by Duncan Steel.

The presentations just kept on flowing and by this point we were approaching information overload. So a stretch of the limbs reinvigorated the blood flow and on to **Dr Joel Berrier** who spoke about "**Discoveries during Solar Eclipses."** This was a presentation about the corona that can be seen at totality as well as solar prominences. The Aug 21 eclipse had a very long duration of totality across the USA, 88 minutes in all, and so observers could see changes in the corona over this time. As part of this observation, NASA was running the CATE Project (Continental America Telescopic Eclipse) whereby volunteers would make and share observations with NASA. A much unknown part of solar physics are the Coronal Mass Ejections and how they occur. Dr. Berrier mentioned the Carrington Effect which in 1858 left so much static electricity in the atmosphere that telegraphs were able to communicate without the use of a power source. Such an event today would likely cause a massive failure with the satellites orbiting Earth and possibly the electrical grid powering much of the world.

This discussion was followed by **Dr Mariana Lazarova** speaking about **"Total Solar Eclipses: Why, When, Where and How."** She spoke about the number of eclipses in a year and that they are considered to be fairly rare since about 70% of the Earth's surface is covered with water and so many of them are not observed. Most of us should know the geometry necessary for an eclipse to occur, for instance that annular eclipses happen because the Moon is too far from the Earth to cover the Sun's diameter, so I'll say no more about this presentation. She did have one stunning picture of the "diamond ring." Having now seen it myself, there is nothing that compares to that moment (for me)!

Our final presentation was given by **Dr Nate Bickford** about **"Wildlife Behaviour when the Sun turns off."** He began by saying that actual research for this effect was scanty. There was only one scientific study about animal behaviour prior to, during and after an eclipse. Although there is much anecdotal information about animal behaviour, only one scientific report about a Blue Bull in the Calcutta zoo showed different behaviour on the day of the eclipse than the day before and after the eclipse. A call on social media resulted in over 1000 people/organizations willing to observe animal behaviour so that a greater scientific study could be made for this eclipse.

On the anecdotal side of things, this traveller noted that there was no rooster crowing in the morning on Sunday and Tuesday. However on Monday, the rooster crowed at dawn and again just before the eclipse. There was no further crowing after the eclipse. Do readers have any other anecdotes?

One final note about the eclipse and animal behaviour. On the trip back to Canada, we stopped at a restaurant for breakfast, and the waitress shared a picture of a night moth [Giant Moth -antheraea polyphemus -ed] that came out before the eclipse but was totally stunned when the Sun returned. She had a lovely picture of it on her cell. [Image left kindly provided by Dawn Coffin.]

Despite not seeing the planetarium in action, the presentation more than made up for the hour long trip to Kearney. There are many memories for me about this trip that I will treasure. Thanks to everyone who helped make it enjoyable and being so friendly and welcoming at the KOA camp. [Ditto for me! -ed]

20-yr old Cassini Spacecraft Gets Viking Funeral

by John Hlynialuk

Intentionally crashing a 5600 kg spacecraft into a planet does not sound like a good thing, but controllers at the NASA Jet Propulsion Lab in Pasadena, California will do just that to end a multi-billion (that "b" is not a typo) dollar mission that has been studying Saturn for the last 13 years. It happens on Sep 15 and it is, in fact, the smart thing to do. One of the discoveries made by Cassini, the vehicle in question (think fully-loaded, over-sized SUV), is that one of the moons of Saturn probably has an ocean under its ice layer that could harbour some form of life. If the spacecraft contaminated that moon with earthly bacteria (spacecraft are routinely sterilized but you can't keep a hardy bug down), it would not be a good thing. It is much wiser to vapourize the vehicle intentionally in Saturn's atmosphere where the incineration would reduce everything to sterile atoms.

But even to the very end Cassini's instruments will be wringing out information about Saturn.

To quote Linda Spilker, Cassini project scientist from NASA's Jet Propulsion Laboratory:

The Cassini mission has been packed full of scientific firsts, and our unique planetary revelations will continue to the very end of the mission as Cassini becomes Saturn's first planetary probe, sampling Saturn's atmosphere up until the last second. We'll be sending data in near real time as we rush headlong into the atmosphere – it's truly a first-of-its-kind event at Saturn.

The data about the composition of Saturn's atmosphere will be added to the wealth of other data and terabytes of images sent back by the spacecraft over the last 13 years. The discoveries have increased our knowledge about the planet immensely; where we had a single chapter in astronomy texts on Saturn, now there are literally dozens of volumes of information about the planet. As of December 2016, there were 3700 papers published in scientific journals using the data from this mission and it is not over just yet.

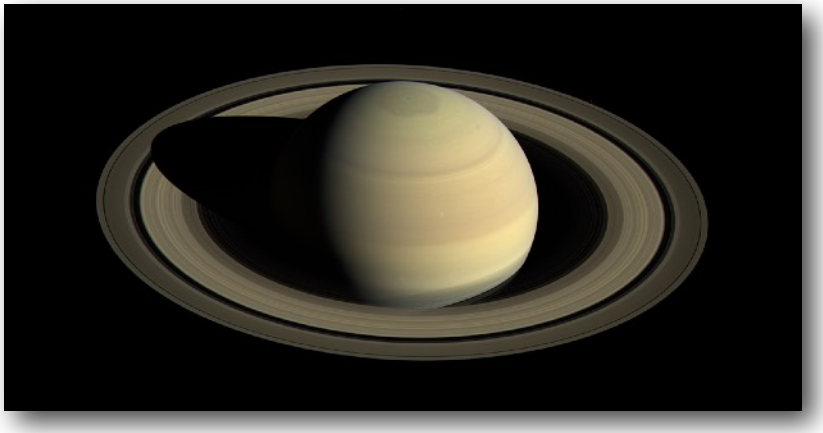
Cassini has clearly transformed our knowledge of the planet. Starting with the beautiful feature visible in telescopes from Earth, Saturn's rings, Cassini found a highly dynamic system of particles constantly changing over time. Another surprise were the small moons embedded in the rings; these carve out gaps leaving behind beautiful sinuous patterns in their wakes. The dynamics of the rings of Saturn have revealed secrets about how planets form around stars and give insights into how our own planet may have coalesced from the dust circling our Sun in our early solar system.

As some discoveries have solved mysteries about Saturn, other mysteries have arisen as scientists scramble to analyze the data coming in. This includes giant hurricanes at Saturn's poles, one with bizarre hexagonal sides unlike anything ever seen. How can this pattern be maintained over time? The number of scientific papers will continue to grow as planetary meteorologists propose theories to explain this unusual structure and other weather patterns in Saturn's immense atmosphere.

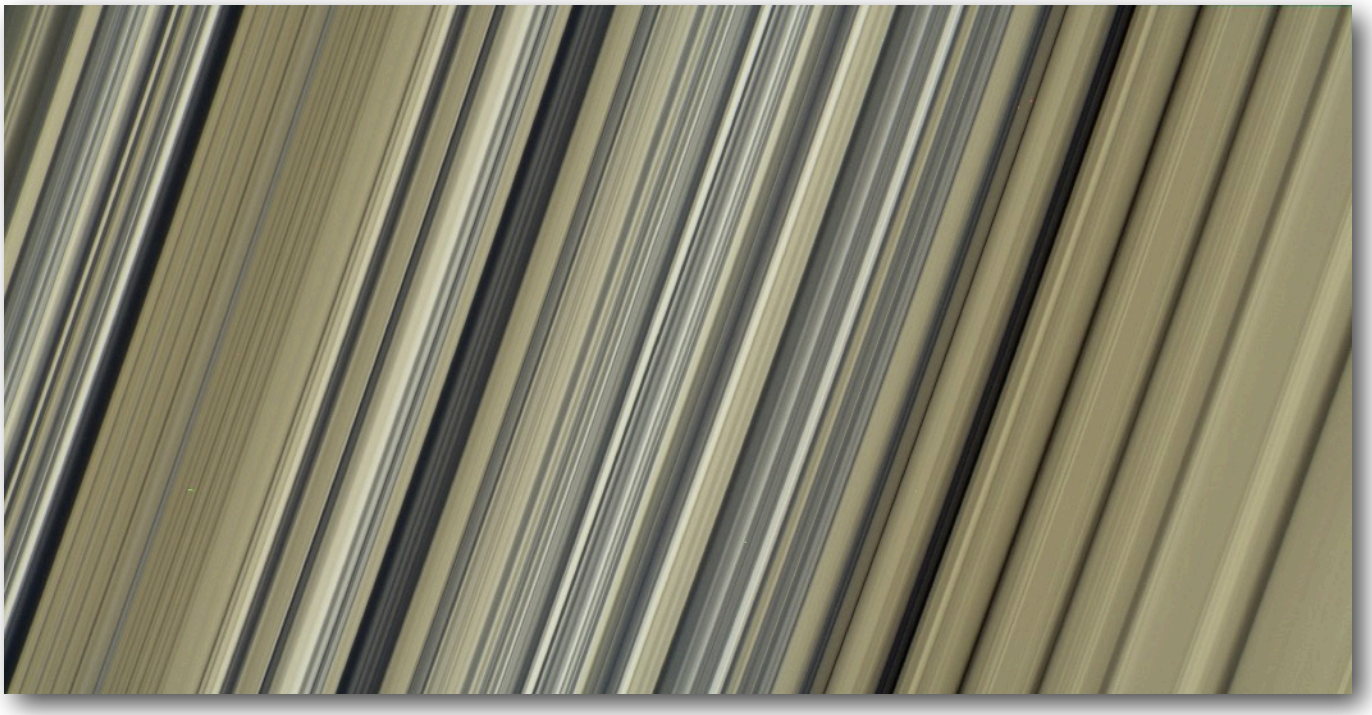
Cassini also studied the dozens of moons circling Saturn and discoveries of wonderful things have involved them as well. Plumes of water vapour stream up from Saturn's moon Enceladus, indicating a sub-surface ocean that is a possible abode for living organisms perhaps like those near Earth's own deep ocean vents, the "black smokers". The Cassini mission to Saturn also involved a smaller spacecraft called Huygens, which piggy-backed on Cassini from Earth and was released to parachute into the atmosphere of Titan, Saturn's most enigmatic moon. There it found hydrocarbon lakes and rivers containing organic compounds, -a world where the chemistry may resemble our early Earth giving us a possible look back at our own evolution.

I highly recommend a look at the NASA Cassini website for more about the spacecraft and its discoveries, including some of the most spectacular images of Saturn, its rings and moons that I have ever seen. The link is provided here: https://saturn.jpl.nasa.gov

NASA/JPL has put together a great video on the Grande Finale of Cassini and you should have a look at the Youtube version here:
https://www.youtube.com/watch?list=PLTiv_XWHnOZpKPaDTVy36z0U8GxoiIkZa&v=xrGAQCq9BMU



Colourful Structure in Saturn's Rings at Fine Scales -NASA/JPL Press Release



These are the highest-resolution color images of any part of Saturn's rings, to date, showing a portion of the inner-central part of the planet's B Ring. The view is a mosaic of two images that show a region that lies between 98,600 and 105,500 kilometres from Saturn's center.

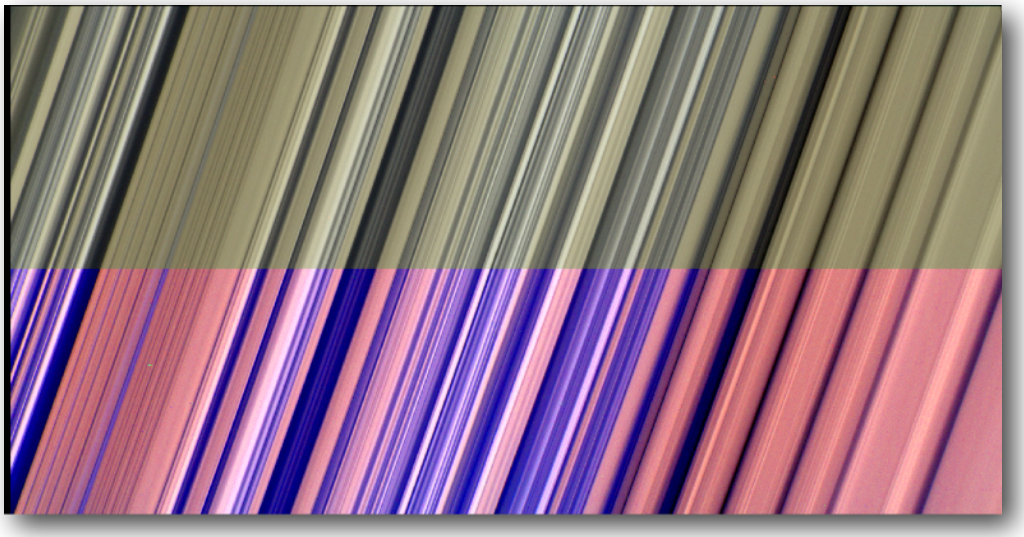
The first image (above) is a natural color composite, created using images taken with red, green and blue spectral filters. The pale tan color is generally not perceptible with the naked eye in telescope views, especially given that Saturn has a similar hue.

The material responsible for bestowing this color on the rings—which are mostly water ice and would otherwise appear white—is a matter of intense debate among ring scientists that will hopefully be settled by new in-situ observations before the end of Cassini's mission.

The different ringlets seen here are part of what is called the "irregular structure" of the B ring. Cassini radio occultations of the rings have shown that these features have extremely sharp boundaries on even smaller scales (radially, or along the direction outward from Saturn) than the camera can resolve here. Closer to Saturn, the irregular structures become fuzzier and more rounded, less opaque, and their color contrast diminishes.
The narrow ringlets in the middle of this scene are each about 40 kilometres wide, and the broader bands at right are about 300 to 500 kilometres across. It remains unclear exactly what causes the variable brightness of these ringlets and bands—the basic brightness of the ring particles themselves, shadowing on their surfaces, their absolute abundance, and how densely the particles are packed, may all play a role.

The second image (below) is a color-enhanced version. Blue colours represent areas where the spectrum at visible wavelengths is less reddish (meaning the spectrum is flatter toward red wavelengths), while red colours represent areas that are spectrally redder (meaning the spectrum has a steeper spectrum toward red wavelengths). Observations from the Voyager mission and Cassini's visual and infrared mapping spectrometer previously showed these color variations at lower resolution, but it was not known that such well-defined color contrasts would be this sharply defined down to the scale (radial scale) of a couple of miles or kilometres, as seen here.

Analysis of additional images from this observation, taken using infrared spectral filters sensitive to absorption of light by water ice, indicates that the areas that appear more visibly reddish in the color-enhanced version are also richer in water ice. **Credit: NASA/JPL-Caltech/Space Science Institute**



The Vagaries of Eclipse Mail

At Starfest this past July, I purchased two First Day Solar Eclipse covers from Fred Espenak and he kindly autographed them for me. I mailed both to myself on Aug 21 from Grand Is. NE as a memento of the eclipse. They went in the mail at the campground about 10 pm Monday Aug 21 and I waited patiently for the envelopes to make their way through the US and Canadian postal systems.

The first arrived Monday, Sep 11, "only" 16 business days later (3 weeks) and when I inquired about the long delay at our local post office, I was told that it was unusual, likely due to the bad weather when hurricanes grounded a lot of planes carrying mail (besides wreaking other havoc).

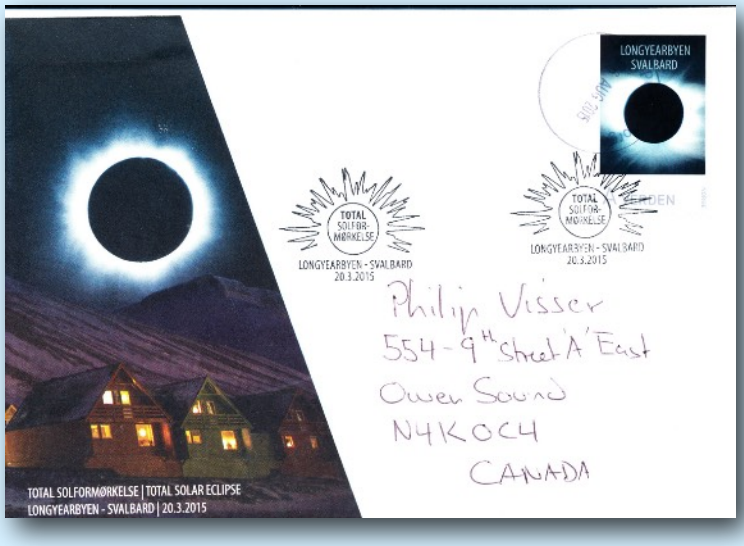
With the first of my "First Day of Issue" envelopes in my hands, I checked the cancellation and I made out a faint "Omaha, NE, Aug 22, 2017" -dang, missed by 1 day. There were the expected barcode tracking marks and wear and tear on the envelope. There was also a piece of tape applied over Fred Espenak's signature. I am not sure why this was done, probably to avoid confusion as to the addressee. Tape was also applied to the second letter as well but both tapes were the removable kind and peeled off with no damage.

As for letter #2, (image top right) it took another 11 days (Sep 22) for it to show up, but it eventually did and my delight at having it arrive was immediately doused by the green marker stripe across the three stamps! Someone had swiped across the stamps presumably to ensure that they were cancelled! If I was a suspicious type, I would suspect that it was a more mean-spirited act than that!

Phil V. one of our members, who is a stamp collector, also tells a story of a pen swipe across a very nice polar bear stamp from Svalbard, Norway. See item in the box right. Like myself and several others, Phil sent himself eclipse mail from Grand Is. NE and his letters arrived much more quickly, about a week after he returned home. I am not sure why there was such a difference in the delivery times for letters from the same US location to the same Canadian destination, literally just a few blocks away from each other in Owen Sound. One of the mysteries of postal services, I guess.

Many countries have issued eclipse stamps in the past to commemorate eclipses that pass over their territory. Romania's stamp is on page 1 upper right corner and the more traditional French stamp for the eclipse of Aug 11, 1999 is shown left.

The Philippines stamp for the eclipse of March 18, 1988 is shown at right. The path of totality was indeed, over the Philippines.



Phil Visser is one of the group that went to Nebraska to see the solar eclipse and on the trip there we got to talking about his hobby which is philately (stamp collecting). Phil recounted his story of mail received from Norway with the stamp defaced (polar bear image below).

In his words:

Hi John
Here is the article about the trip to Kearney. [see pg 6 -ed] I also looked for the cover I had been talking about that had received a pen cancel, well my memory is getting mixed up, because it was not the eclipse cover [centre image above], *but another cover also from Svalbard. The background behind pen cancels is that postal clerks are instructed to cancel mail that has not been properly cancelled so that people cannot use the stamp for a second time. While the theory works for national stamps, international stamps are simply unnecessary to put a pen cancel through.*

The eclipse cover [centre image above] *is interesting from a philatelic point of view, in that a special cancel was made for the event. Also of interest from a navigation perspective is that [the] Svalbard post office is simply the Northern-most post office in the world. Also included is another letter mailed from Svalbard that contains stamps showing the eclipse, and the northern lights* [not shown -ed].

Cheers
Phil

Perseus (Per)

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

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

DOUBLE STARS

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

MESSIER OBJECTS

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

Objects of Interest in Perseus

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

Objects of Interest in Cassiopeia

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

In Cassiopeia, can be found **NGC 457,** the **ET Cluster.** Look for the star marked ϕ at the spot labeled "ET" on chart at right. This star is one of the eyes of ET. ϕ–Cas is a nice double of 5th and 7th magnitudes, coloured yellow and blue, that is easily separated in a telescope. I have shown this cluster to many and I have never yet had a child or an adult who cannot see the resemblance. It is also called the Owl Cluster, Caldwell 13, the Skiing Cluster and the Kachina Doll Cluster but the ET name has caught on. There are a number of other NGC clusters nearby that could easily be called ET's "family". It turns out that **M103,** near ET**,** is a nice open cluster as well. It is described by Kepple and Sanner in **Vol 1** of the **Night Sky Observer's Guide** as shaped like a Christmas tree. (The true Christmas Tree cluster is NGC 2264 which includes the Cone Nebula in Monoceros). So show off ET, M103 -a Christmas Tree, and the Double Cluster -a triple treat in Cassiopeia and Perseus!

ET Cluster, or NGC 457 (image left) was taken by Hendryk Kowalewski and is a public domain image available on Wikipedia.

Cassiopeia (Cas)

α-Cassiopeiae -Schedar
β-Cassiopeiae - Caph γ-Cassiopeiae -Navi [Ivan backwards -ed]

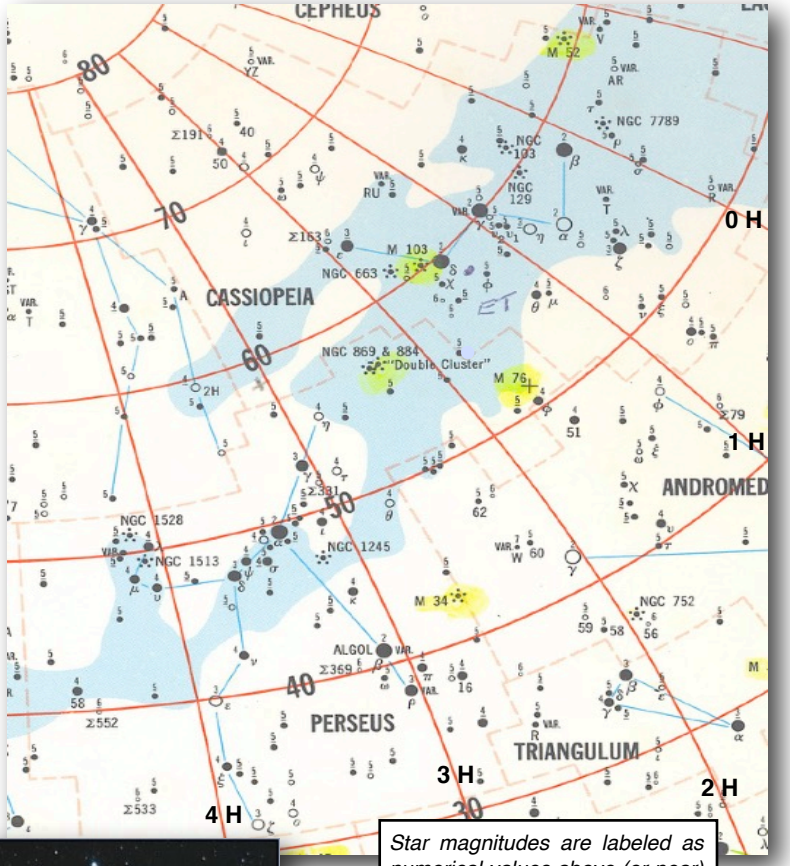
Cassiopeia is an easily recognized constellation; its five 2nd and 3rd magnitude stars form a widespread W or M, depending on its position in the sky. It is the same distance from the pole as Ursa Major. A line connecting α Andromedae, γ Pegasi and β Cassiopeiae marks the equinoctial colure; where this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

DOUBLE STARS

	Mag.	Sep (s)	Location	Remarks
α	2.5-9.0	64	003856	Yellow-Blue
η	3.5-7.3	11	004758	Yellow-Purp; easy in sm. scope
ι	4.7-7.0-8.2	2-7	022567	Yellow-Blue-Blue; fine triple
σ	5.4-7.5	3	235755	Green-Blue; fine field
ϕ	4.5-8.9	25	012268	[the "eyes" of ET -ed]
Σ163	6.2-8.2-9.7	35-115	014864	Gold-Blue
Σ191	6.2-8.5	5	015974	

MESSIER OBJECTS

	Mag	Location	Remarks
M 52	7.3	232261	Open Cluster. Very fine.
M 103	7.4	013060	Open Cluster



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

Chart Legend
Star Location
Double Stars
Nebulae
Clusters
Variable Stars
Var

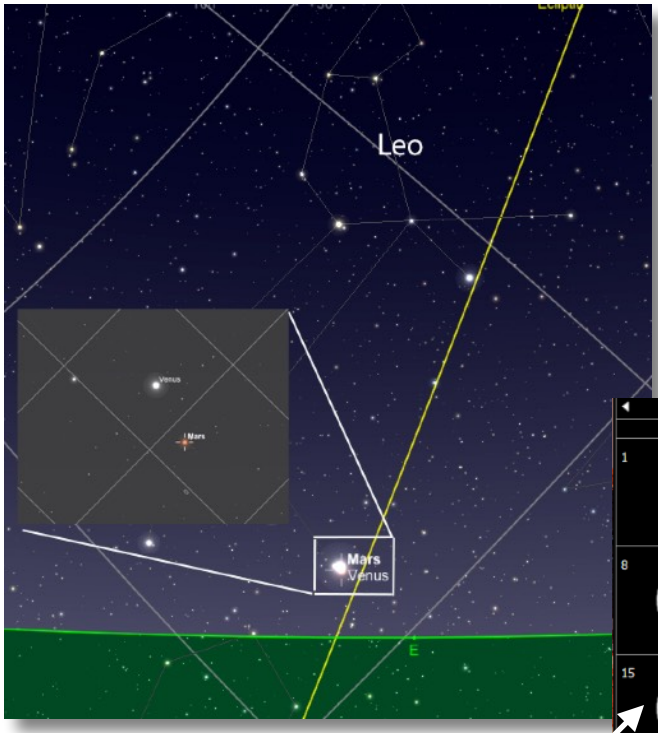
Event times in EST with 24-h clock unless indicated otherwise

Oct 05 Thu 19:00 Venus 0.2° N of Mars (16 min. separation shrinking to 12.5 min. in daytime)
08 Sun 17:00 Mercury at Superior Conjunction (not visible)
09 Mon 01:51 Moon at Perigee: 366 858 km
09 Mon 14:05 Aldebaran 0.6°S of Moon
13 Fri 16:29 Beehive 3.0°N of Moon
15 Sun 06:54 Regulus 0.2°S of Moon (occ.5:48 am EDT to 6:30 am -early Sunday morning event)
17 Tue 06:04 Mars 1.8°S of Moon
17 Tue 20:21 Venus 2.0°S of Moon
19 Thu 13:00 Uranus at Opposition
21 Sat 07:00 Orionid Meteor Shower (20/h) Moon 3% !!
24 Tue 07:54 Saturn 3.3°S of Moon
24 Tue 22:25 Moon at Apogee: 405 151 km
26 Thu 14:00 Jupiter in Conjunction with Sun (not visible)
Moon phases: FM Oct 05; **LQ** 12; **NM** 19; **FQ** 27

Special Events

Venus and Mars VERY Close Oct 5

Look in the morning sky for a very close conjunction of Venus and Mars in the morning on Thursday, Oct 5. The two planets clear the eastern horizon around 5:40 am EDT. There is bright nearly full Moon sinking on the opposite horizon so the sky will be bright, but Venus will be -3.9 magnitude and not easily missed. Mars is fainter and still on the opposite side of the solar system from us and magnitude 1.8. Both planets are almost fully illuminated by sunlight, and appear quite gibbous.The separation at Venus/Mars rise is about 1/4 of a degree so they both should fit into a medium power eyepiece field of view. You can try for a view in the daytime as well of course. Separation does not change much for the whole day.



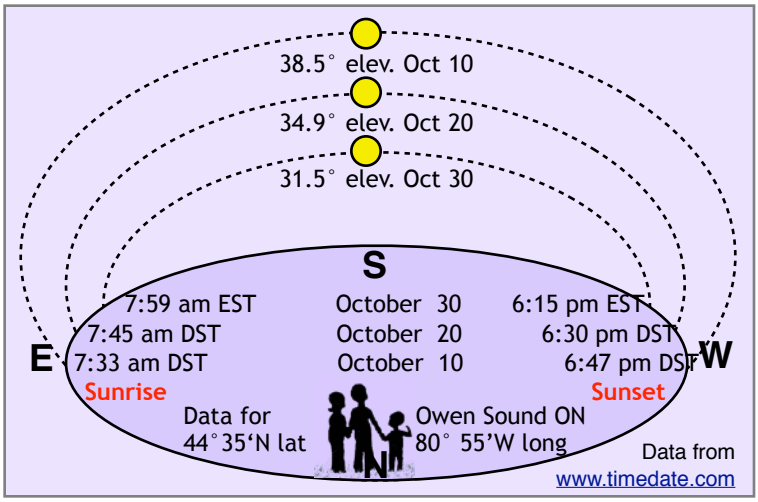
Regulus occulted by Moon Oct 15.

The alpha star of Leo gets occulted in the early morning hours of Sunday Oct 15 from 5:48 am to 6:30 am. Regulus is a 1.4 magnitude star and the Moon on this date is a 4-day old crescent, so it will be a nice sight. Regulus is a multiple star system with at least one companion visible, an 8th magnitude star at a separation of 177 seconds of arc.

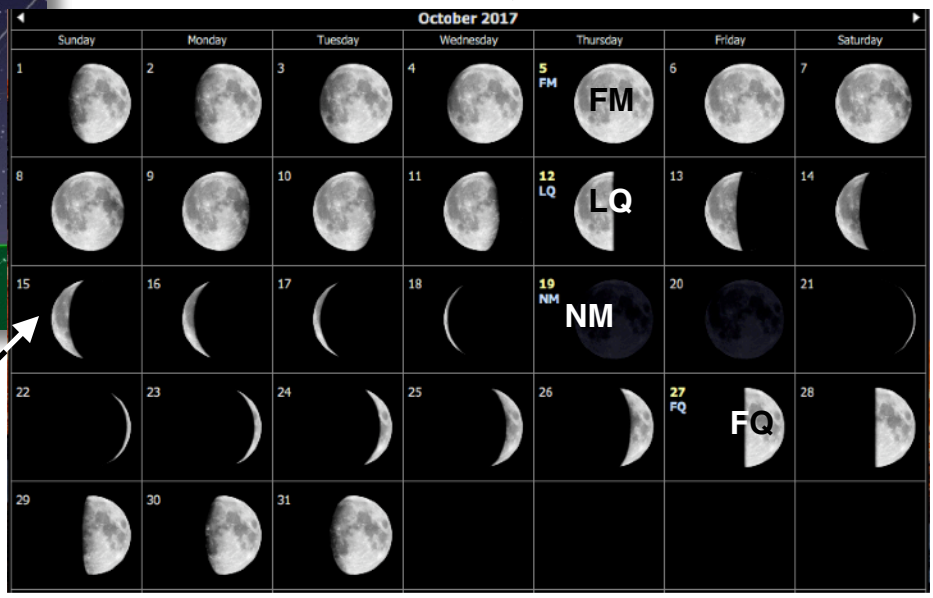
Planets

MERCURY is poorly placed near the Sun up to mid-October, but starts to become better placed by month-end and even better in Nov. **VENUS,** (-3.9) is a morning sky object, and continues closing on the Sun all month (passing Mars Oct 5). **MARS,** mag. 1.8 finally pulls away from the Sun and is visible for an hour in dark sky in the east before sunrise. **JUPITER**, is very close to the Sun at sunset and in conjunction (closest to Sun) on Oct 26. **SATURN,** (mag. +0.5) is in the SW sky at sunset and sets between 2 and 3 hours later. **URANUS,** (5.8) reaches opposition Oct 19 so is in good viewing position. **NEPTUNE,** (7.9) rising ahead of Uranus is also in good view. **Dwarf planet**, **Ceres** (8.7) rises around midnight and is in the NE sky all night while **Asteroid, Vesta** (7.9) is too close to the Sun to be easily seen. **PLUTO** (mag. 14) is in evening skies near the "Lemon" in Sagittarius. It follows Saturn by 23° and sets an hour after the ringed planet. Charts for these planets and asteroids for 2017 are on the BAS website.

The diagram below gives the sunrise/sunset times and the Sun's altitude for October. The Sun passed the autumnal equinox Sep 22 and is lowering in the sky as fall continues. The moon phase graphic at the bottom of this page shows the lunar phase for each night of the month. Times of moonrise for FM Oct 5 is 14:40, LQ Oct 12 is 08:25, NM Oct 19 is 14:12 and FQ Oct 27 is 18:22. These are times of moonrise for Owen Sound and not times of the specific phases which may be earlier or later by several hours.



Moon Phase Chart for October 2017
created with QuickPhase Pro 4.2



BAS Member Loaner Scopes

Solar H-alpha scope now available.

Our Lunt solar scope can be borrowed by BAS members and it is waiting at the Fox! Contact John to get your hands on it. We now have a suitable mount for it as well. 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)

FOR SALE: 14.5 inch Swayze Mirror Dobsonian telescope

Contact John H. at 519-371-0670 or stargazerjohn@rogers.com.

FOR SALE: 12.5 inch f/6 Dobsonian telescope

Homebuilt by experienced telescope maker in 1980. See Sep 2014 SGN pg 9 for build details. Truss tube design with full thickness Coulter mirror -one of their best, recently re-aluminized. Focuser and secondary mirror/ spider is a Novak unit. Alt-azimuth mount (3/4-inch ply) is a nice wood grain finish with coating of Varathane. This is a large telescope and probably would be happy in a relatively permanent location, but is portable if you have lots of trunk space. Loading into and out of a car trunk is easier with two people. Can be seen at the Fox Observatory. Asking $900 but willing to negotiate. Contact John H. at 519-371-0670 or stargazerjohn@rogers.com.

FOR SALE: Observing chairs

$50 each

Contact John H. at 519-371-0670 or stargazerjohn@rogers.com.

BAS member Julian Delf is one of the ten local photographers whose works are featured in the "**Aperture Photography Show**" in November at the Legacy Gallery of the Owen Sound Artist's Co-op. Join Julian and the other photographers for an opening reception on Nov 5

More details here:

http://aperture.mapleseedgallery.ca