Shoalhaven Astronomers Inc.
www.shoalhavenastronomers.asn.au

Volume 19
Issue 8

Astro Flyer

AUGUST 2019

Club News

To the SA members,
A very large thank you to the outgoing president – Frank Gross. He has held the association together over the last 2 years and has volunteered to continue as treasurer & secretary. I don't know how he does it but I am very glad he does… Thanks are also due to the outgoing office bearers & committee members, those who have volunteered to continue in their present roles and those new members who have stepped up to the plate to actively participate in the management of the association.

Looking to the future, I hope to streamline communications within the association by re-establishing the web-site and the Facebook group as the "goto" locations for current association information, interesting astronomy topics & data and information about upcoming events, both association and astronomy related. I am putting together an initial set of articles for the website however they won't conflict or overlap with the current "flavour" of content in the ***Astro Flyer***. The magazine, the website and the Facebook page all address different audiences so it is critically important that our magazine continue in its current form.

The topics presented at our monthly meetings need to be of interest to you – the members – so if you have not responded to my survey questions of last month (or didn't get the email) please respond at your earliest convenience. This month –if all goes to plan – John Bambury will be presenting "Visual Astronomy and the Use of Filters " and I look forward to seeing all of you there.

Mark Town President Shoalhaven Astronomers

Next monthly meeting will be held at the Shoalhaven Campus of the Uni of W'Gong, George Evans Road off Yawal Road, West Nowra, August 16th 6.30 pm for 7pm start.

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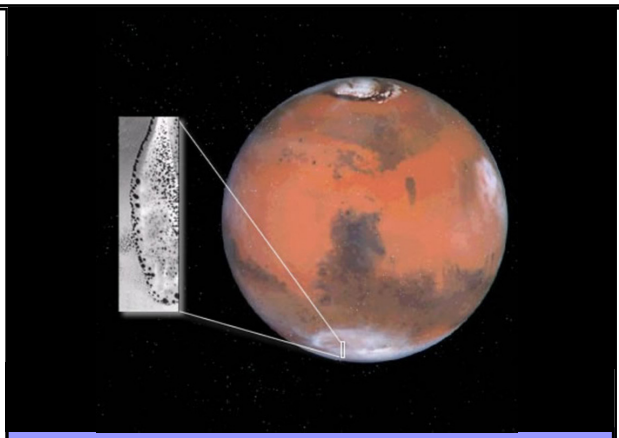

MOON PHASES

New Moon	First Quarter	Full Moon	Last Quarter
Aug 1st	Aug 8	July 17	July 25

Viewing Nights

Club viewing nights are selected to provide viewers with the best possible conditions for good viewing. They are held on specific Saturdays at different locations around Nowra.

The next club viewing night will be on Saturday 10 Aug (back-up night Sun 11 Aug) at Woncur Rd

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OUT THERE
Bob Turnbull OBSERVATION OFFICER

SEPTEMBER TO OCTOBER

Hello Members, it's great to see some clearer skies at night and plenty of interesting things to look at!
Please refer to the August September OUT THERE, which covers the rest of August, sent out last month.
I hope you enjoyed "THE PLANETS" on ABC TV on Sunday evenings over the last four weeks. Brian Cox's masterful dialogue and the incredible real space program photographs plus the artist's projections of the surfaces of many planets, through which Brian was walking, were the best and most informative yet seen on public media to my knowledge.

PLANETS

SATURN
Will be occulated by the Moon, however those viewers who wish to see it will need to be on a line from Rockhampton in Queensland to the Great Australian Bight and will be seen (depending upon where you view from this reference line) from late evening on the 8th of September to the early morning of the 9th.

Saturn will be visible in the dark (post twilight) high in the northern sky near Sagittarius (pretty easy target!) and by the 18th September after its retrograde loop it resumes a west to east move.

MERCURY can be seen later in Virgo over a brilliant VENUS on the 29th of September and be 1.3 degrees to the North of the brightest Star in Virgo, Spica. Mercury will be at its brightest viewing in the evening in October.

EARTH Will be in Equinox on the 23rd of September, when the day and night are of equal length and will rise and set be just above the Eastern and Western horizons.

VENUS Returns to the evening sky and will be on the Western horizon by midmonth and easy to see by end of month.

MARS will be seen again in October in the morning sky but hard to see in the dawn brightness.

JUPITER is in Ophiuchus high in the North Western sky after evening twilight and a first quarter Moon will be close by.

Keep warm and get in some good viewing in your own sweet way.

Regards

BOB TURNBULL

VIEWING NIGHTS

Club/Social Viewing Nights are on Saturday evenings "just" Before Sunset. Viewing nights are for members and invited guests. The contingency plan for poor weather on the proposed viewing night is to meet the next night (a Sunday night) .

Woncur Road, South Nowra (Head South down The Princes Highway, turn right at BTU Road, Woncur Road is the street first on the left).

University Viewing site. On the way to the university on George Evans Road go straight ahead through the second turning circle to the new viewing site.

SHOALHAVEN ASTRONOMERS SUGGESTED VIEWING NIGHTS

JUNE to DECEMBER 2019

AUGUST 10th	WONCUR ROAD	6 PM TO 8 PM
SEPTEMBER 21st	NOWRA UNIVERSITY CAMPUS	6 PM TO 8 PM
OCTOBER 5th	MEMBERS HOME CHOICE	6 30 PM TO 8:30 PM
NOVEMBER 2nd	WONCUR ROAD	6 45 PM TO 9:00 PM
DECEMBER	TO BE ARRANGED AS REQUIRED (OPTIONAL)	

Bring your scopes and or binoculars and a small folding chair, a decision on the day planned, depending on viewing conditions, by the club president and his deputy.

Email information if details are changed, to all, or contact Frank for changes.

Solar viewing BBQ lunches (BYO) may be held and these will be advised ahead of these events. Special events such as Comets, eclipses etc. may also warrant members night viewings.

Bob Turnbull
OBSERVATION OFFICER

The Visual Astronomer
Part 9

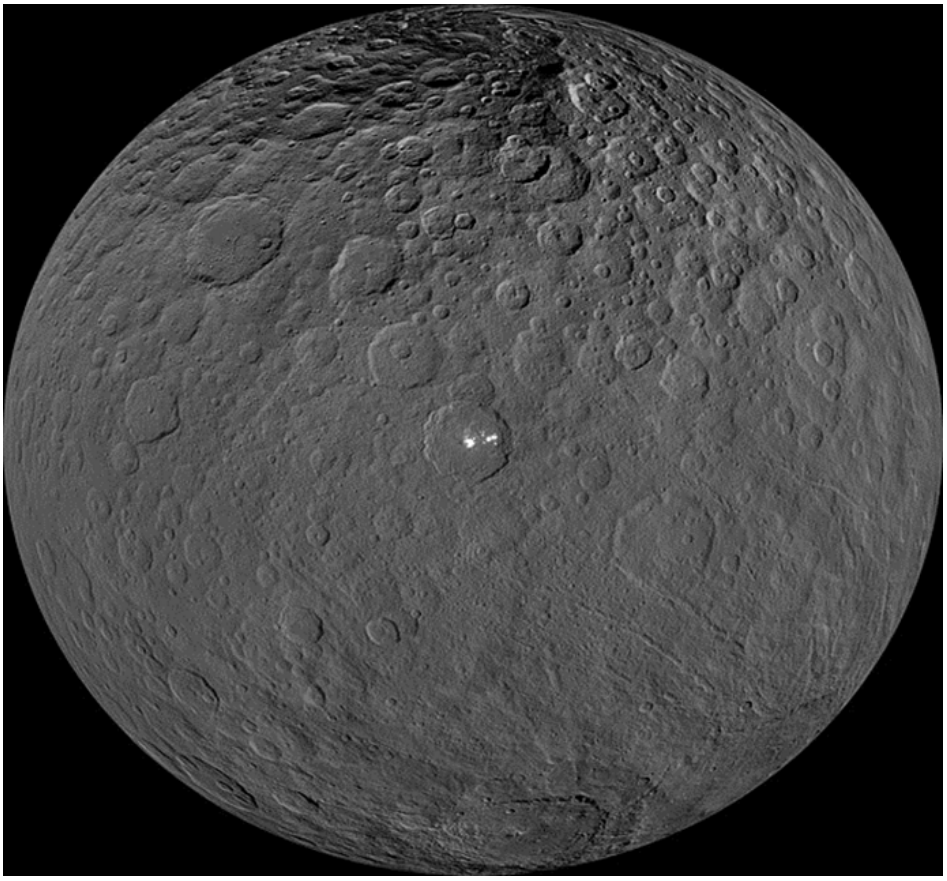
Eugene O'Connor

Dwarf Planet Ceres Moves through Scorpio

Ceres, our only Dwarf Planet in the Asteroid Belt between Mars and Jupiter, swings through Scorpio this month and arrives at opposition on August 28th. At 7.3 magnitude, the first ever discovered asteroid is worth finding though binoculars or a small telescope. Discovered by Giuseppe Piazza in 1801, it was thought to be a planet is 945 klms in diameter and with a mass equal to 1/3 of all the other asteroids combined.

With no rings or moons little was known about it until the NASA Dawn space probe examined the planet in 2015 and discovered a pock-marked, round body similar to our moon but with what proved to be water vapour pouring from fissures in its crust (see centre Fig 1 right).

Note the high mountain, Ahuna Mons, near the top of the picture, a 4 klm high volcanic-like mountain formed by ejecta of rocks and saltwater.



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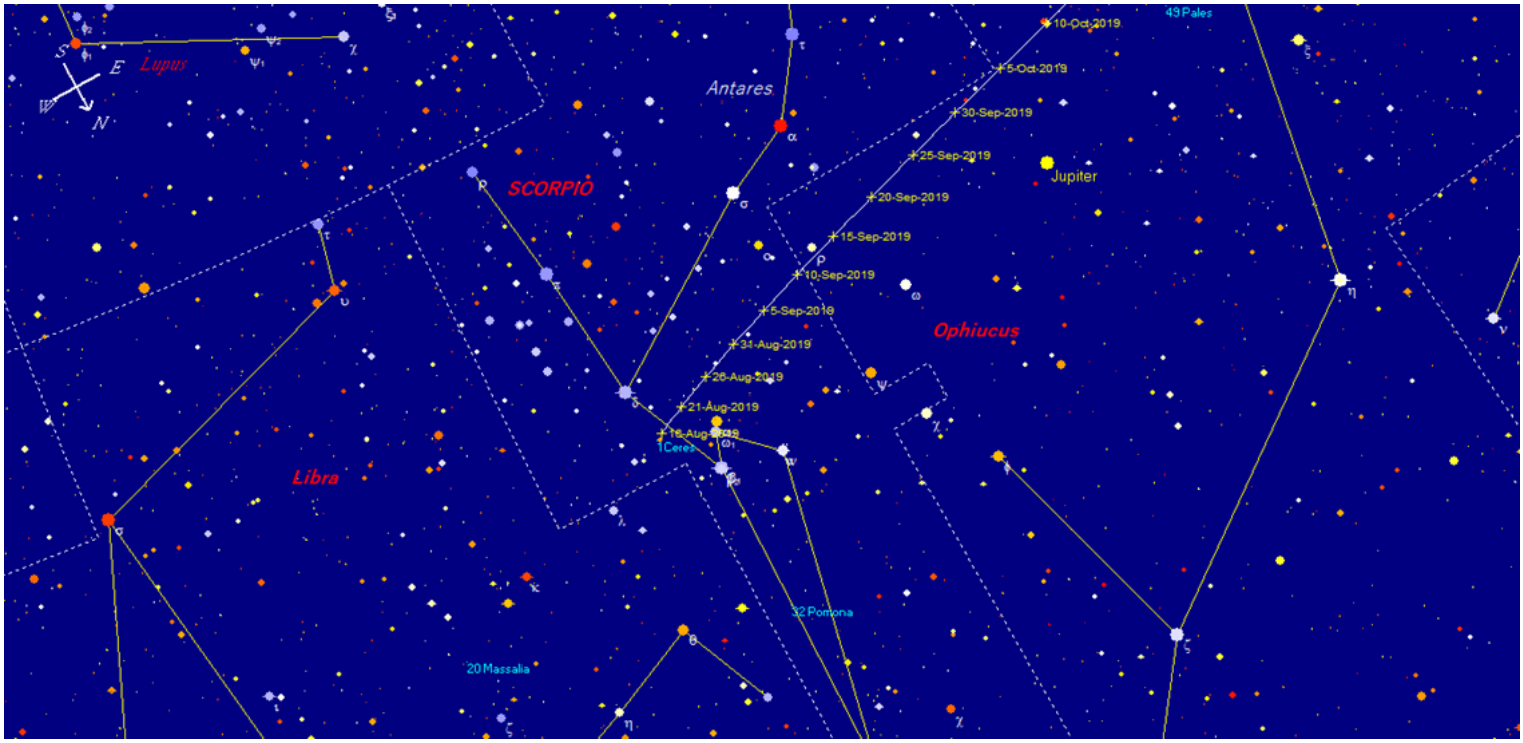


Libra
Scorpio *Ophiuchus*

(Above: Track of Ceres in Scorpio in August - September 2019. Mag 7.3)

Tips for Viewing Ceres.

1 Become familiar with the NW section of Scorpio using binoculars and a dark sky.
2 Work out from the chart the position of Ceres close to marked date.
3 A detailed star atlas (many great free ones online, including Cart de Ciel and Deep Sky Hunter (down to mag. 10!) helps.
4 Become familiar with groups of stars in the target area.
5 Draw your own star chart pattern and over some days you will notice the star that has moved.
6 You have observed your first Dwarf Planet
(Scorpio is best viewed when past the zenith this month)

I have viewed Ceres with 4" binoculars on 4 occasions in July and noticed its blue colour and changing position from night to night.

Cont...3

Your Coloured Star Challenge

As mentioned at the July meeting I am listing stars which have varied reports on their colour and as noted there I feel some can possibly be the result of ageing eyes and cataracts or other influences, such as older, less accurate optics – as noted by Jack.
I have selected a list of stars-some double or multiple-near Jupiter this month. Maps were provided at the July meeting;

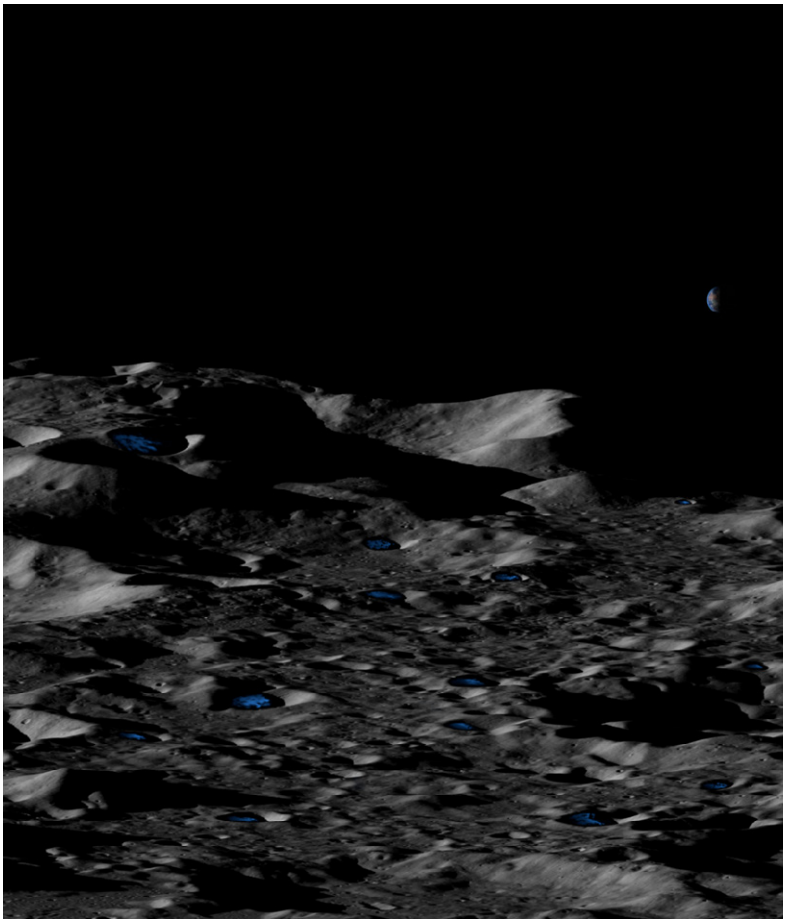
1 Zubeneschamali. Brightest star in Libra. Many see it as the only green star in the sky.
2 Xi Scorpio; Yellow and Deep Blue.
3 Beta Scorpio. A wide Yellow and blue binocular double. Some see a hint of green in the primary.
4 Nu Scorpio; multiple star; Yellow and blue and a close yellow pair in same field.
5 Sigma Scorpio; Off white and pink. Strong light contrast at mag.2.9/5.1.
6 Rho Ophiuchus: Multiple: Blue and Reddish. 2 other pairs in field.
7 Antares: Alpha Scorpio: Close pair: Mag. 1/5.4. I have seen companion green in dusk but blue in darkness. V. hard split!

Footnote: I have emailed a pre-occultation picture of Saturn minutes before the waxing Moon blots it out on the evening of August 12th. If you did not receive this picture you are not on the mailing list for astro updates.

Astro Events from Frank Gross

The Moon and Mercury May Have Thick Ice Deposits Aug. 3, 2019

Earth's Moon and Mercury, the closest planet to the Sun, may contain significantly more water ice than previously thought, according to a new analysis of data from NASA's LRO and MESSENGER spacecraft.
The potential ice deposits are found in craters near the poles of both worlds. On the Moon, "We found shallow craters tend to be located in areas where surface ice was previously detected near the south pole of the Moon, and inferred this shallowing is most likely due to the presence of buried thick ice deposits," said lead author Lior Rubanenko of the University of California, Los Angeles.



Conceptual illustration of permanently shadowed, shallow icy craters near the lunar south pole.
Credits: UCLA/NASA

In the past, telescopic observations and orbiting spacecraft have found glacier-like ice deposits on Mercury, but as of yet not on the Moon. The new work raises the possibility that thick ice-rich deposits also exist on the Moon. The research may not only help resolve the question regarding the Moon's apparent low ice abundance relative to Mercury, but it could also have practical applications: "If confirmed, this potential reservoir of frozen water on the Moon may be sufficiently massive to sustain long-term lunar exploration," said Noah Petro, Lunar Reconnaissance Orbiter Project Scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

The poles of Mercury and the Moon are among the coldest places in our solar system. Unlike Earth, the spin axes of Mercury and the Moon are oriented such that, in their polar regions, the Sun never rises high above the horizon. Consequently, polar topographic depressions, such as impact craters, never see the Sun. For decades it has been postulated these so-called permanently shadowed regions are so cold that any ice trapped within them can potentially survive for billions of years.

Previous observations of the poles of Mercury with Earth-based radar revealed a signature characteristic of thick, pure ice deposits. Later, MESSENGER – the MErcury Surface, Space ENvironment, GEochemistry and Ranging spacecraft – imaged these ice deposits. "We showed Mercury's polar deposits to be dominantly composed of water ice and extensively distributed in both Mercury's north and south polar regions," said Nancy Chabot, instrument scientist for MESSENGER's Mercury Dual Imaging System from the Johns Hopkins Applied Physics Laboratory in Laurel, Maryland. "Mercury's ice deposits appear to be much less patchy than those on the Moon, and relatively fresh, perhaps emplaced or refreshed within the last tens of millions of years."

Previous radar and imaging studies of the Moon, whose polar thermal environments are very similar to those of Mercury, found only patchy, shallow ice deposits. This outstanding difference served as the motivation for the UCLA researchers' work – a comparative analysis of polar craters on Mercury and the Moon to delve into this difference between the two worlds. The research was published July 22 in *Nature Geoscience*.

Cont...2
The airless surfaces of Mercury and the Moon are scarred by many impact craters. These craters form when meteoroids or comets impact the surface. The team analyzed simple craters that are formed by smaller, less energetic impactors. These depressions are held together by the strength of the surface dust layer, or regolith and tend to be more circular and symmetrical than large craters. The UCLA scientists exploited this inherent symmetry to estimate the thickness of ice trapped within simple craters.

The study used elevation data obtained by MESSENGER and LRO to measure approximately 15,000 simple craters with diameters ranging from 2.5 km to 15 km (about 1.5 miles to 9.3 miles) on Mercury and the Moon. Researchers found that craters become up to 10% shallower near the north pole of Mercury and the south pole of the Moon, but not the north pole of the Moon.

The authors concluded that the most probable explanation for these shallower craters is the accumulation of previously undetected thick ice deposits on both worlds. Supporting this conclusion, the researchers found that the pole-facing slopes of these craters are slightly shallower than their equator-facing slopes, and that the shallowing is more significant in regions that promote ice stability because of Mercury's orbit around the Sun. The topographic signal detected by the scientists is relatively more prominent in smaller simple craters, but does not preclude the possibility that ice may be more widespread in larger craters across the lunar pole.

Additionally, unlike Mercury, where the ice has been shown to be nearly pure, the deposits detected on the Moon are most likely mixed with the regolith, possibly in a layered formation. The typical age of the simple craters examined by the researchers indicates they could potentially accumulate ice that was later mixed with overlying regolith over long time scales. The scientists found that these inferred buried ice deposits are correlated with the locations of already detected surface ice. This finding could imply that the exposed ice deposits may be exhumed, or they could result from molecular diffusion from depth.

The research was funded by the LRO and MESSENGER missions. LRO is managed by NASA's Goddard Space Flight Center in Greenbelt, Maryland, for the Science Mission Directorate at NASA Headquarters in Washington. Launched on June 18, 2009, LRO has collected a treasure trove of data with its seven powerful instruments, making an invaluable contribution to our knowledge about the Moon. MESSENGER was managed by the Johns Hopkins University Applied Physics Laboratory. The spacecraft was launched Aug 3, 2004, and began orbiting Mercury on March 18, 2011. The mission ended with a planned impact on the surface of Mercury on April 30, 2015. NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.

8 Cool Destinations That Future Mars Tourists Could Explore

By Elizabeth Howell July 24, 2018 Spaceflight

Touring Mars
Mars is a planet of vast contrasts — huge volcanoes, deep canyons, and craters that may or may not host running water. It will be an amazing location for future tourists to explore, once we put the first Red Planet colonies into motion. The landing sites for these future missions will likely need to be flat plains for safety and practical reasons, but perhaps they could land within a few days' drive of some more interesting geology.
Here are some locations that future Martians could visit.

Cont...3

Olympus Mons

NASA/MOLA Science Team/ O. de Goursac, Adrian Lark

Olympus Mons is the most extreme volcano in the solar system. Located in the Tharsis volcanic region, it's about the same size as the state of Arizona, according to NASA. Its height of 16 miles (25 kilometers) makes it nearly three times the height of Earth's Mount Everest, which is about 5.5 miles (8.9 km) high.

Olympus Mons is a gigantic shield volcano, which was formed after lava slowly crawled down its slopes. This means that the mountain is probably easy for future explorers to climb, as its average slope is only 5 percent. At its summit is a spectacular depression some 53 miles (85 km) wide, formed by magma chambers that lost lava (likely during an eruption) and collapsed.

Tharsis Volcanoes

NASA/JPL

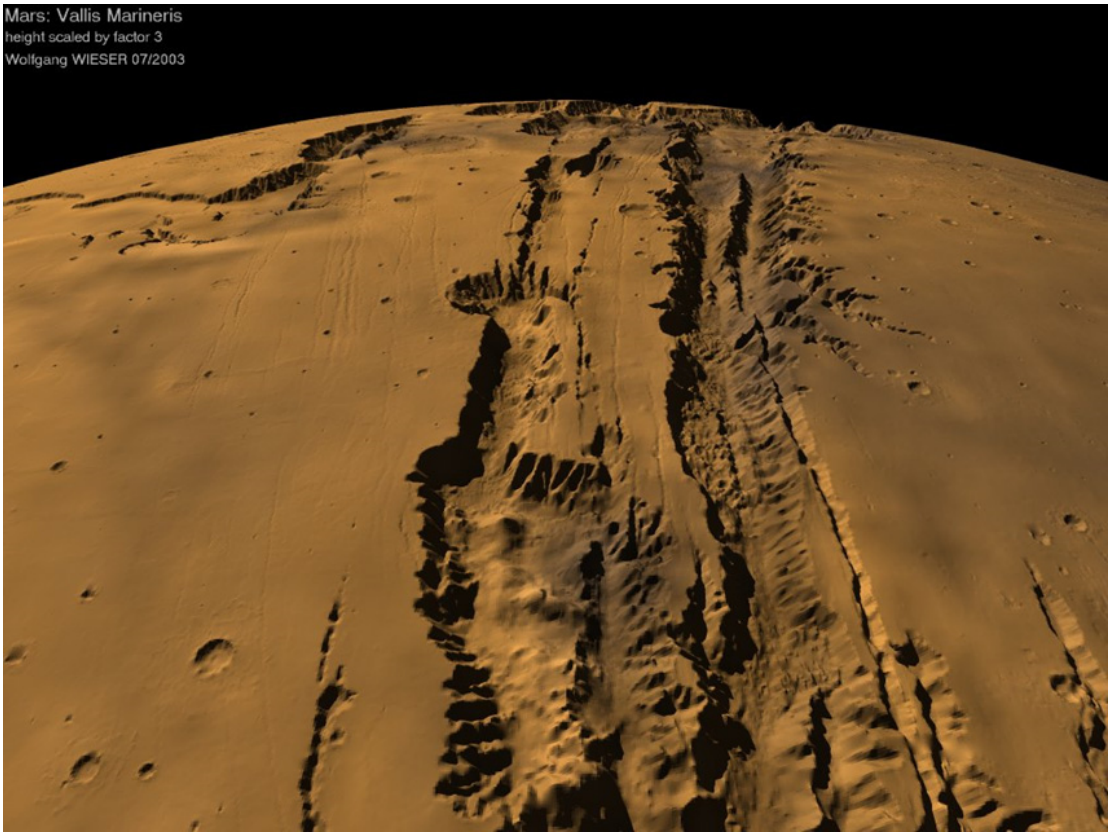
While you're climbing around Olympus Mons, it's worth sticking around to look at some of the other volcanoes in the Tharsis region. Tharsis hosts 12 gigantic volcanoes in a zone roughly 2500 miles (4000 km) wide, according to NASA. Like Olympus Mons, these volcanoes tend to be much larger than those on Earth, presumably because Mars has a weaker gravitational pull that allows the volcanoes to grow taller. These volcanoes may have erupted for as long as two billion years, or half of the history of Mars.

The picture here shows the eastern Tharsis region, as imaged by Viking 1 in 1980. At left, from top to bottom, you can see three shield volcanoes that are roughly 16 miles (25 km) high: Ascraeus Mons, Pavonis Mons, and Arsia Mons. At upper right is another shield volcano called Tharsis Tholus.

Cont...4

Valles Marineris

NASA



Mars not only hosts the largest volcano of the solar system, but also the largest canyon. Valles Marineris is roughly 1850 miles (3000 km) long, according to NASA. That's about four times longer than the Grand Canyon, which has a length of about 500 miles (800 km).

Researchers aren't sure how Valles Marineris came to be, but there are several theories about its formation. Many scientists suggest that when the Tharsis region was formed, it contributed to the growth of Valles Marineris. Lava moving through the volcanic region pushed the crust upward, which broke the crust into fractures in other regions. Over time, these fractures grew into Valles Marineris.

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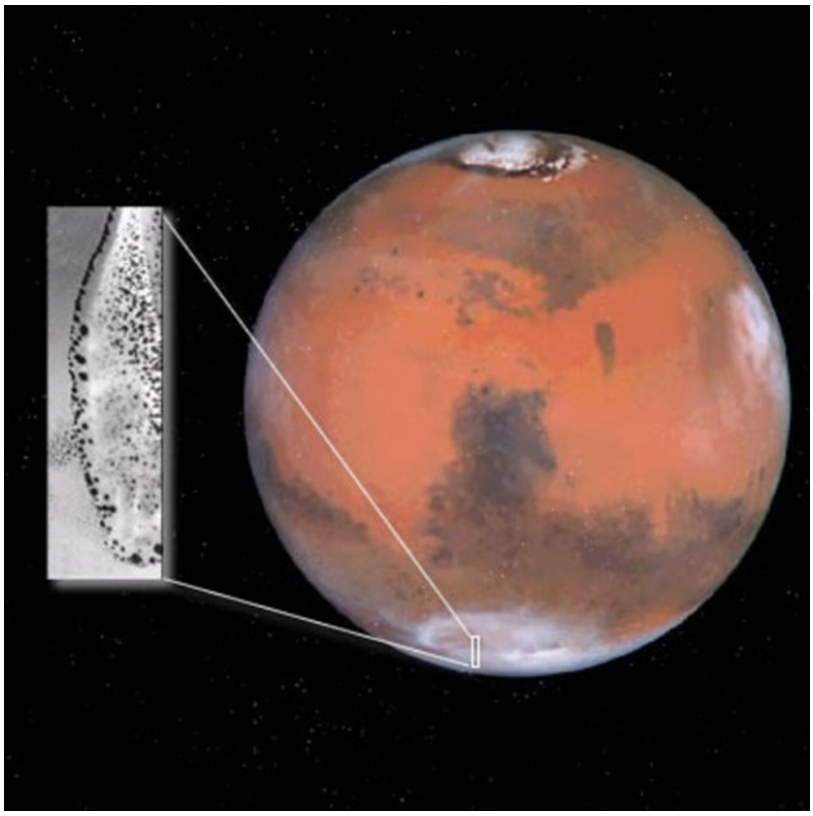
The North and South Poles

NASA/JPL/USGS

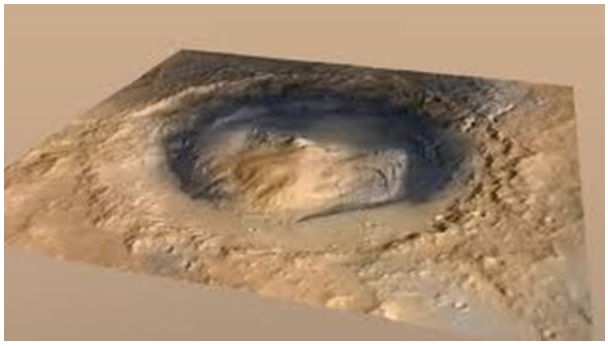


Mars has two icy regions at its poles, with slightly different compositions; the north pole (pictured) was studied up close by the Phoenix lander in 2008, while our south pole observations come from orbiters. During the winter, according to NASA, temperatures near both the north and south poles are so frigid that carbon dioxide condenses out of the atmosphere into ice, on the surface.

The process reverses in the summer, when the carbon dioxide sublimates back into the atmosphere. The carbon dioxide completely disappears in the northern hemisphere, leaving behind a water ice cap. But some of the carbon dioxide ice remains in the southern atmosphere. All of this ice movement has vast effects on the Martian climate, producing winds and other effects.

Gale Crater and Mount Sharp (Aeolis Mons)

NASA/JPL-Caltech/ASU



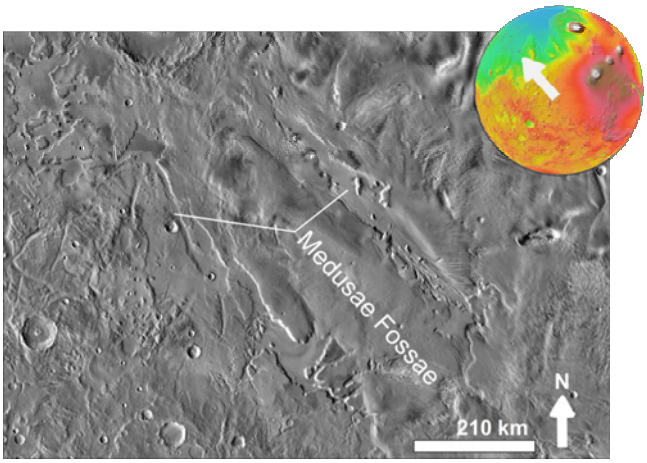
Made famous by the landing of the Curiosity rover in 2012, Gale Crater is host to extensive evidence of past water. Curiosity stumbled upon a streambed within weeks of landing, and found more extensive evidence of water throughout its journey along the crater floor. Curiosity is now summiting a nearby volcano called Mount Sharp (Aeolis Mons) and looking at the geological features in each of its strata.

One of Curiosity's more exciting finds was discovering complex organic molecules in the region, on multiple occasions. Results from 2018 announced these organics were discovered inside of 3.5-billion-year-old rocks. Simultaneous to the organics results, researchers announced the rover also found methane concentrations in the atmosphere change over the seasons. Methane is an element that can be produced by microbes, as well as geological phenomena, so it's unclear if that's a sign of life.

Cont...6

Medusae Fossae

ESA

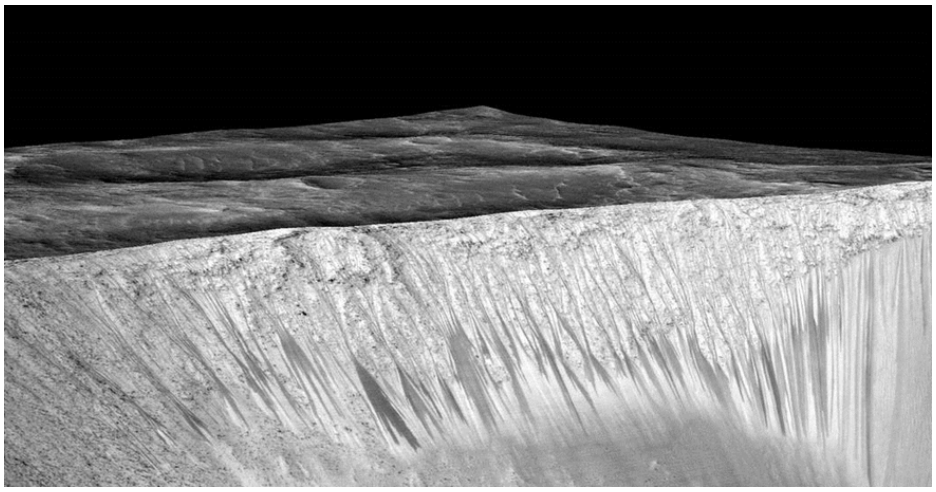


Medusae Fossae is one of the weirdest locations on Mars, with some people even speculating that it holds evidence of some sort of a UFO crash. The more likely explanation is it is a huge volcanic deposit, some one-fifth of the size of the United States. Over time, winds sculpted the rocks into some beautiful formations. But researchers will need more study to learn how these volcanoes formed Medusae Fossae.

A 2018 study suggested that the formation may have formed from immensely huge volcanic eruptions taking place hundreds of times over 500 million years. These eruptions would have warmed the Red Planet's climate as greenhouse gases from the volcanoes drifted into the atmosphere.

Recurring Slope Lineae in Hale Crater

NASA/JPL-Caltech/Univ. of Arizona



Mars is host to strange features called recurring slope lineae, which tend to form on the sides of steep craters during warm weather. It's hard to figure out what these RSL are, though. Pictures shown here from Hale Crater (as well as other locations) show spots where spectroscopy picked up signs of hydration.

In 2015, NASA initially announced that the hydrated salts must be signs of running wateron the surface, but later research said the RSL could be formed from atmospheric water or dry flows of sand.In reality, we may have to get up close to these RSL to see what their true nature is. But there's a difficulty — if the RSL indeed host alien microbes, we wouldn't want to get too close in case of contamination. While NASA figures out how to investigate under its planetary protection protocols, future human explorers may have to admire these mysterious features from afar, using binoculars.

Cont...7

'Ghost Dunes' in Noctis Labyrinthus and Hellas Basin

NASA/JPL/University of Arizona

Mars is a planet mostly shaped by wind these days, since the water evaporated as its atmosphere thinned. But we can see extensive evidence of past water, such as regions of "ghost dunes" found in Noctis Labyrinthus and Hellas basin. Researchers say these regions used to hold dunes that were tens of meters tall. Later, the dunes were flooded by lava or water, which preserved their bases while the tops eroded away.

Old dunes such as these show how winds used to flow on ancient Mars, which in turn gives climatologists some hints as to the ancient environment of the Red Planet. In an even more exciting twist, there could be microbes hiding in the sheltered areas of these dunes, safe from the radiation and wind that would otherwise sweep them away.

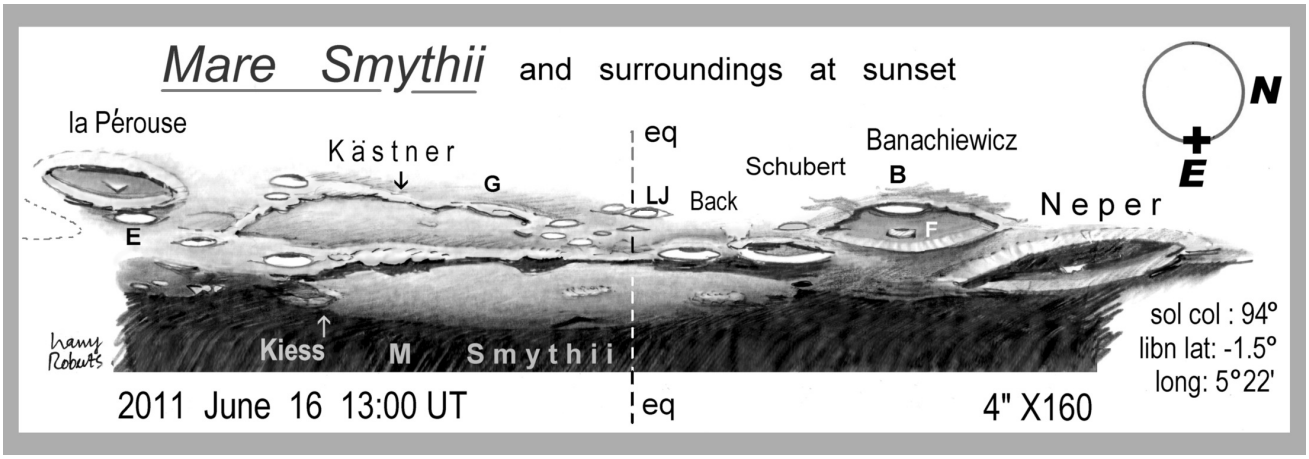
Moon Watching by Harry Roberts

Seldom Seen – Smythii & Jenkins

The Moon offers many amazing vistas – some may be once in a lifetime views! Riccioli named the lunar "seas" after mood states, weather or geographic terms – but there are two exceptions: Humboldt's Sea and Smyth's Sea (the latter a British astronomical Admiral, the former the German explorer). Both are 19th C additions to the original list of "seas". Mare Smythii is an old basin formation on the Moon's extreme eastern limb – and, due to libration, is not often seen.

The writer's four-inch Maksutov, kept handy, often 'gets' rare views – as on June 16, 2011. The Moon was just past full and low magnification showed unfamiliar detail all along the east limb –amid which, a round basin stood out strikingly. *What was that?*

It was large, about ⅔ the size of nearby Mare Crisium.. Sketching the basin and its neighbours at 167 'times' took thirty minutes (Fig) and at cloudy moments I searched Rűkl for the answer: it was **Mare Smythii**, under good lighting and libration – an uncommon sight!



The 'scope showed a round basin, almost side-on, ringed by a low unbroken rim, higher in places, with a smooth floor and hints of low "hills" on the sunset horizon. The view, much like those from Apollo era capsules, was a spectacular oblique vista!

An astronaut standing in Smythii would see the sun setting in the west at altitude 6º, casting shadows ten times longer than the height of any feature. The shadows of Smythii's encircling scarp are about 15 - 30km wide and the 10**:**1 ratio suggest the rim is mostly 1.5km high, rising to 3km. "Virtual Moon" put the sunset shadow at longitude 86º, so we see only half of Smyth's Sea. Some of the "hills" in the basin are floor-fracture craters (FFC, there are many), but better seeing was needed for details.

Neighbours: some unusual landforms lay nearby. Most striking was Neper, a huge crater 137km wide, almost half of Smythii (at 300km). Deep, with terraced walls and a peak piercing the shadows, it was a striking crater. North of it was shallower Banachiewicz, 'eye-catching' with a brilliant white crescent: crater Banachiewicz B, the brightest thing in the field. SE of Banachiewicz were Schubert and Back, two fresh craters on Smythii's rim.

Moon Watching by Harry Roberts

Cont...2

South of Smythii we find ‘fresh’ la Pérouse - with its historic Sydney link and bright central peak. Between la Pérouse and Back a long thin “walled plain” wavered across almost 200km: Kästner and Kästner G, two ancient overlaps – much like Struve in the lunar NW.

Louise Jenkins. There is much to see in this unfamiliar region- including crater ‘**LJ’** (Fig). This is US astronomer Louise Jenkins (1888-1970).

While she is memorialised with a crater name, she is not as well-known as others thus rewarded. She was a Yale astronomer, a catalogue(r) of stars, including variables. As well she used parallax for stellar distances and later edited the “Astronomical Journal” for 16 years. An impressive career.

Maybe historians have given the Harvard ‘female computers’ closer attention; *“The Glass Universe” (*2016), a very fine account of the Harvard Women - makes no mention of Yale or Jenkins.

Crater Jenkins. ‘Her’ crater is 38 km diameter, an impressive size, but in ‘scopes will always be squashed into a thin ellipse, if it can be seen at all!

A superb view of Smythii from the north (Kiess top centre) is in the “**Kaguya Lunar Atlas**”– a “must-have” for moon-watchers; though Jenkins is not shown.

All told - it was a good return for a short session, on a cold and moonlit night. Clear skies!

More Club News continued from page 1

The AGM was held at the July 2019 monthly meeting. Elected officials for 2018 - 2019

President: Mark Town
Vice President: John Gould
Secretary/Treasurer: Frank Gross
Public Officer; Frank Gross
Observation Officer: Robert Turnbull
Editor: Kaye Johnston
Librarian: Chris O'Hanlon

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Chris O'Hanlon, John Gould, Ernest Royston, Anthony Peters

Check out the Astro Flyer on the web site: www.shoalhavenastronomers.asn.au

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The deadline for Articles for the Astro Flyer is The First Friday of the Month.

Editor Kaye Johnston

Club Video Projector Rental

The Video Projector is available for club members for a small rental fee. If a club member would like to project a football game, cricket game onto a wall for a party this is the way to go. You will get up to a 100 inch diagonal picture on a light coloured wall with the Epson video projector. The projector has an inbuilt speaker but you can add your own speaker units if necessary. The unit s very easy to use and instruction would be given before the borrowing (2 days) occurs. The rental price is set at present at $15 for two days.