



Hello All,

July is **Annual General Meeting** month. Hope to see as many people at the meeting as possible for the election of officers. Before coming to the meeting leave just a bit earlier and when you get to the second turning circle (on the way to the university), on George Evans Road go straight ahead through the circle and check out another alternate telescope viewing sight we plan to use on **the next viewing night, July 14th**. If you turn left at that second circle you end up at the Monthly Meeting venue. The area has some construction going on so be careful when you drive by it.

An extra long Lunar Eclipse is going to happen later this month, weather permitting. In fact people in the know are claiming it will be the longest of the 21st century. Read all about it at the end of my section in the AstroFlyer.

We are trying to eliminate things not needed in our library. Chris O'Hanlon will be setting all kinds of neat stuff on a table for sale. Most items can be had for a gold coin donation, with other, more expensive items, available too.

Frank Gross, President

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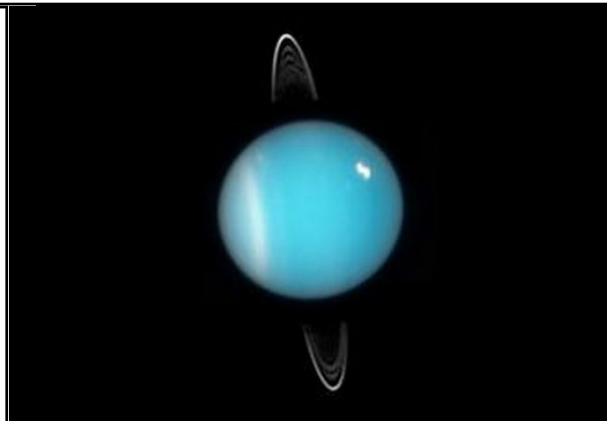
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MOON PHASES



New Moon **First Quarter** **Full Moon** **Last Quarter**
July 13 **July 20** **July 28** **August 5**

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 14 July (back-up night Sun 15 July) at the university** see instructions above.

More viewing nights
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OUT THERE

Bob Turnbull OBSERVATION OFFICER

OUT THERE – JULY/AUGUST

MARS

Is the target for July and as I have been previously suggesting, Photography should be the way to go. Driven telescopes should be the best option and since there are a few of these in the club, we should match them up with suitable cameras.

I am one who has a driven scope but lack the camera or connector for this purpose. The still or sequential multiple pictures for stacking and processing, and video images, which could be gathered at 30 minute intervals for 1 or two minutes then another video grab at 30 minutes etc.

Practice would be a smart way to train us so when the real time arrives we will know how to do it at our best.

WARNING There will be a full MOON when Mars reaches opposition Can you believe it !!? so masking the camera and scope may help with Moonlight which may degrade our images.

SATURN

Can be seen in mid August transiting in the rich stars of Sagittarius in retrograde and finishes in the Trifid and Lagoon nebulae

JUPITER

Is in Libra high in the NW and stays within 2 degrees of Alpha Librae, which is duller than the Beta star!

NEPTUNE

Is at opposition early next month (September) but in August it is rising just after astronomical twilight.

IMAGING The ISS

If you have the will to photograph this International Space Station read the excellent notes on p.52 of your Astronomy 2018. Low magnification should be tried initially as this should give a better chance with this close, and thus fast moving subject.

Clear viewing

Bob Turnbull



A Search for Southern Doubles

Episode 17: Capricorn, The Goat

This wedge-shaped constellation rises in the east after dark in early winter. It has become prominent this winter as the planet Mars not only visits but does so during a very favourable opposition of the planet. During the month ahead, it draws our attention to the line of stars forming the top of the wedge that is the western edge of Capricorn. By a stroke of good fortune all our selected double stars this month can be found and observed on the western edge of Capricorn (see map below). The map shows also the movement of Mars as it retreats westwards in this constellation where it leaves towards the end of August, giving us two good viewing months ahead.



1. Alpha Cap. **a1, a2**, RA 20. 18; Dec -12.33. mag 3.7/4.2/11; sep378"/1.2"

Alpha Cap is a wide naked eye double on the NW tip of Cap and consists of unrelated stars that are stunning in small optics. Both stars are also true binaries with faint companions visible in moderate telescopes. The wide double form a deep Yellow pair and the easily spotted companion of a1 looks deep red in my machine. a 2 has also a wide faint companion seen in clear conditions.

2. Beta Cap. **β1, β2**; RA 20.21; Dec -14.47. mag 3.2/6.1/8.8; sep3.4"/4.4". Beta Cap is a triple star where the components can be spotted in binoculars. The main stars are a contrasting yellow and blue and the fainter mag 8.8 is whitish. Neat group.

Sky Objects By Eugene O'Connor

Cont...2

The following three stars are grouped together like a neat triangle about a third of the distance south of alpha and Beta Cap and on the western section of Capricorn. The map below shows their relative positions.

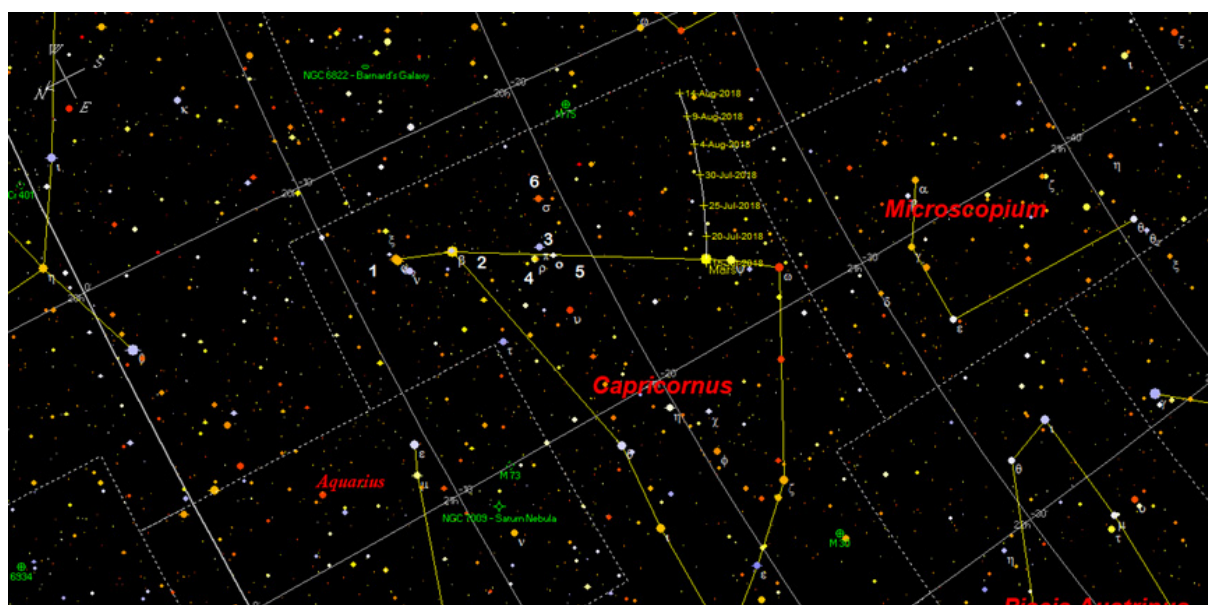
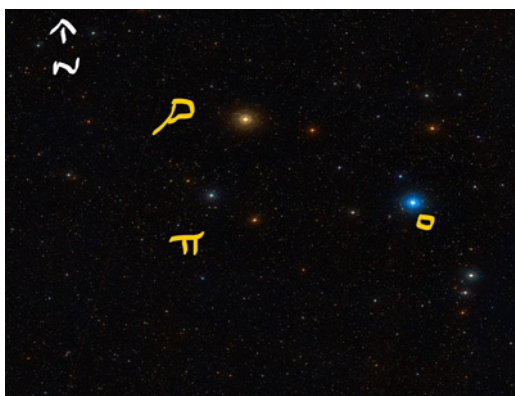
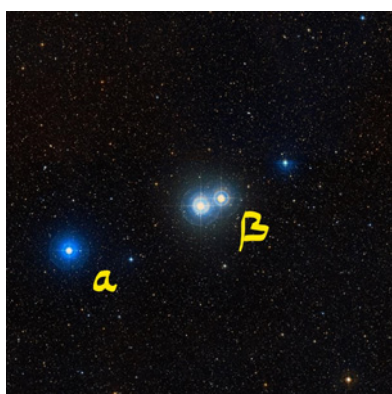
3. Pi π Cap. RA 20hr.27'; Dec -18.13°. mag 5.1/8.5; Sep 3.2" Pi is a wide almost equal yellow pair of stars and easy at moderate power.

4. Rho ρ Cap. RA 20hr 28'/ Dec -17.9°. mag 5/6.9; Sep 1.6 Rho is a real challenge and it took me several nights of variable seeing to finally prise the brownish looking tiny 8.5 star away from the white primary and only at high power. Worth the effort!

5. Omicron \omicron Cap. RA 20hr.29'; Dec -18.35°; mag 5.9/6.7; Sep 22". This a wide pair of yellow and orange stars with a fainter blue companion near the fainter of the two.

6. Sigma σ Cap. RA 20h 19'; Dec -19.07. Mag 5.5/9.0; Sep 55.9". This is a deep yellow and blue pair easily split. It is found near the group of three doubles listed below.

A final word on Mars On at least six nights I attempted to study markings on Mars. Each time at X200 I failed to see anything except darkened areas. Even on the best nights when Jupiter's Great Red Spot and filaments (festoons) in the bands stood out clearly, Mars defeated me. Harry reports on dust storms blanketing detail and suggests higher power for is needed. I feel he is right, but during the next dark Mars will be closer and rise earlier. The quest continues!



(Map showing Capricorn high in the SE sky after dark and plotting the journey of Mars in the month ahead.)

Astro Events from Frank Gross

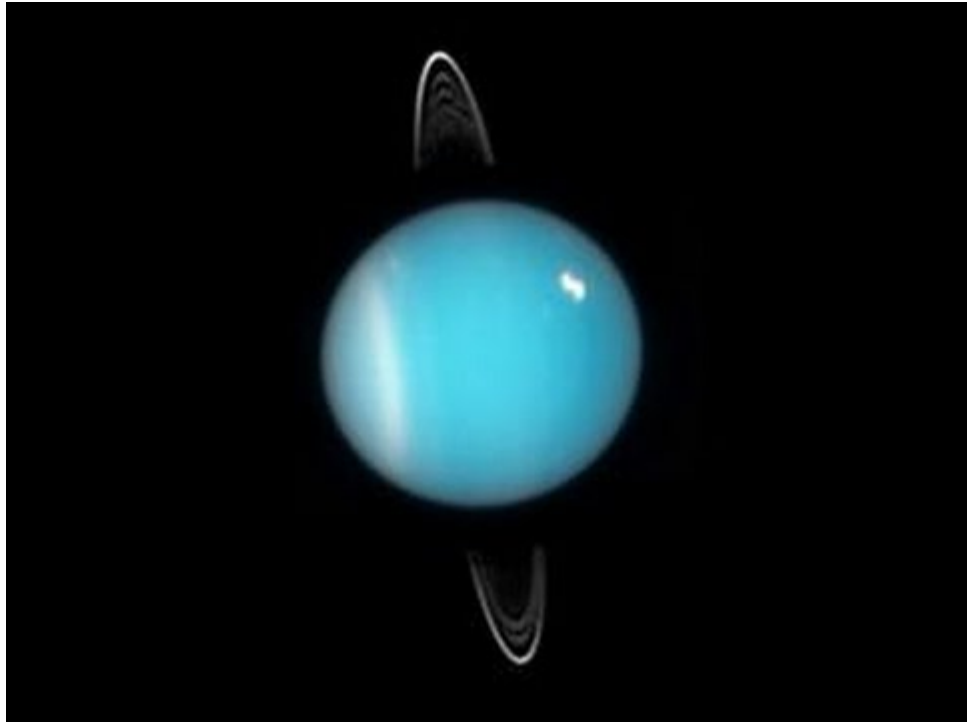
Something Big Crashed into Uranus and Changed It Forever

By Chelsea Gohd, Space.com Staff Writer, July 5, 2018 09:57am ET

It turns out that Uranus is so weird because of a massive collision billions of years ago.

A new study confirms that this collision with a huge object — which was approximately twice the size of Earth — could have led to the planet's extreme tilt and other odd attributes.

Uranus, the planet with the unforgettable name, is unique in a number of ways. "All of the planets in the solar system are spinning more or less in the same way ... yet Uranus is completely on its side," Jacob Kegerreis, the new study's lead author and a researcher at Durham University's Institute for Computational Cosmology in the U.K., told Space.com. And this isn't the only thing that makes the planet so strange.



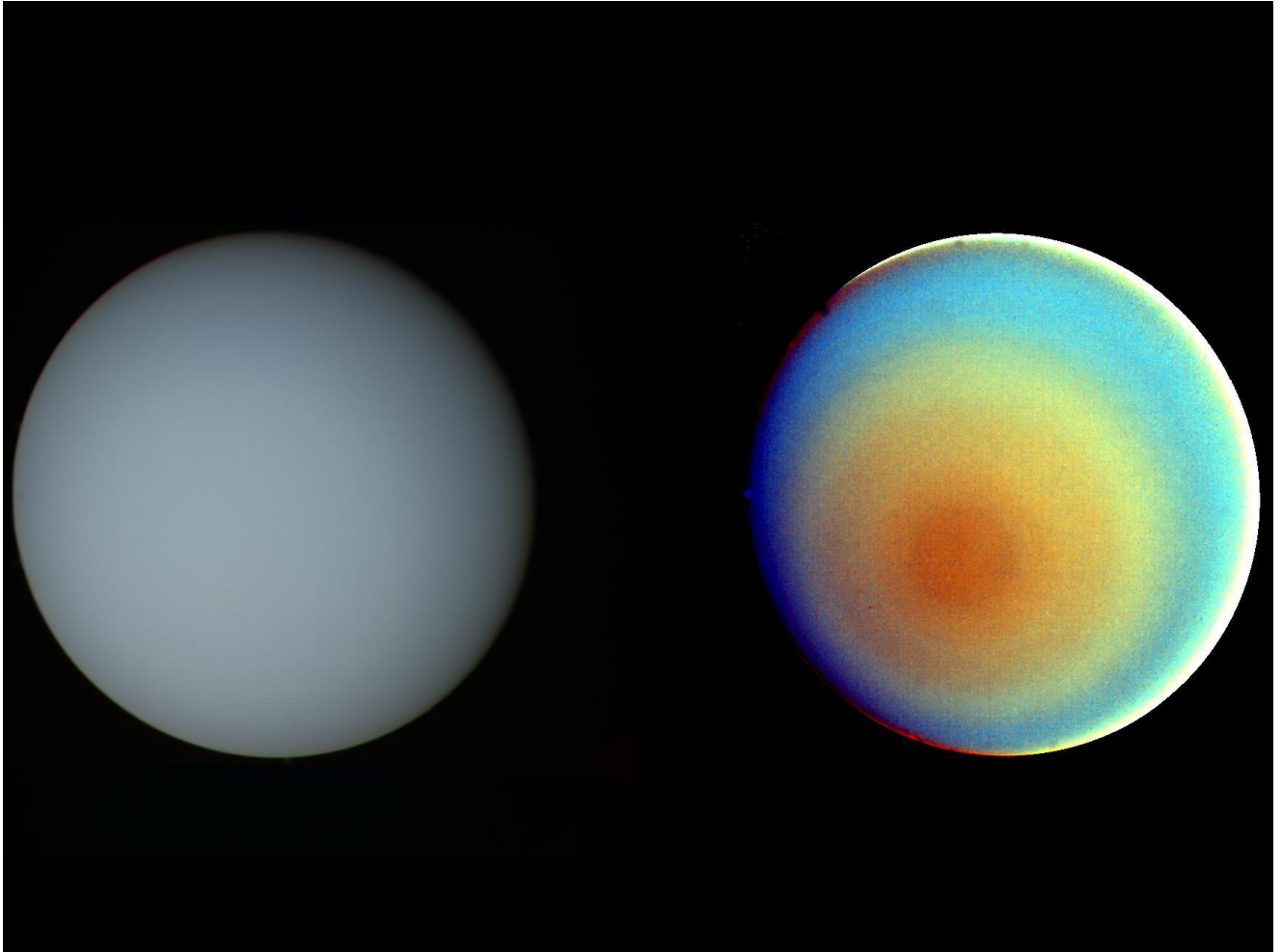
Uranus also has a "very, very strange" magnetic field and is extremely cold, even though it "should" be warmer, according to Kegerreis. In this study, Kegerreis and his team of astronomers seek to explain many of the planet's odd features by attributing them to a collision with a massive, icy object about 4 billion years ago. To better understand how the impact affected Uranus' evolution, the team used a high-powered supercomputer to run a simulation of massive collisions — something that has never been done before. This study confirms an older study that suggested Uranus' significant tilt was caused by a collision with a massive object.

The researchers suspect that this object was probably a young protoplanet, made up of rock and ice. This collision is "pretty much the only way" that we can explain Uranus' tilt, Kegerreis said. Amazingly, Uranus retained its atmosphere after this impact. The researchers think that this is because the object only grazed the planet, hitting it hard enough to change its tilt but not enough to affect its atmosphere, according to a statement from Durham University.

It's likely that this type of event isn't uncommon in the universe: "All the evidence points to giant impacts being frequent during planet formation, and with this kind of research, we are now gaining more insight into their effect on potentially habitable exoplanets," Luis Teodoro, study co-author and researcher at the BAER/NASA Ames Research Center, said in the statement.

Astro Events from Frank Gross

Cont...2



This composite image, created in 2004 with Keck Observatory telescope adaptive optics, shows Uranus' two hemispheres.

Credit: Lawrence Sromovsky, University of Wisconsin-Madison/W.W. Keck Observatory

But this enormous object crashing into Uranus did more than just knock it into a new tilt. According to this research, when the object hit Uranus, some of the debris from the impact may have formed a thin shell that continues to trap heat coming from the planet's core. This could at least partially explain why Uranus' outer atmosphere is extremely cold. According to Kegerreis, this collision could also explain two other oddities about the tilted planet. First, it could explain how and why some of Uranus' moons formed. The researchers think that the impact could have knocked rock and ice into the young planet's orbit — debris that later became some of Uranus' 27 moons. Additionally, they think that the collision could have altered the rotation of any moons that already existed at the time. Last year, a separate study also explored this aspect of the collision.

The researchers also suggest that the collision could have created molten ice and lumps of rock inside the planet, which tilted its magnetic field, according to the statement.

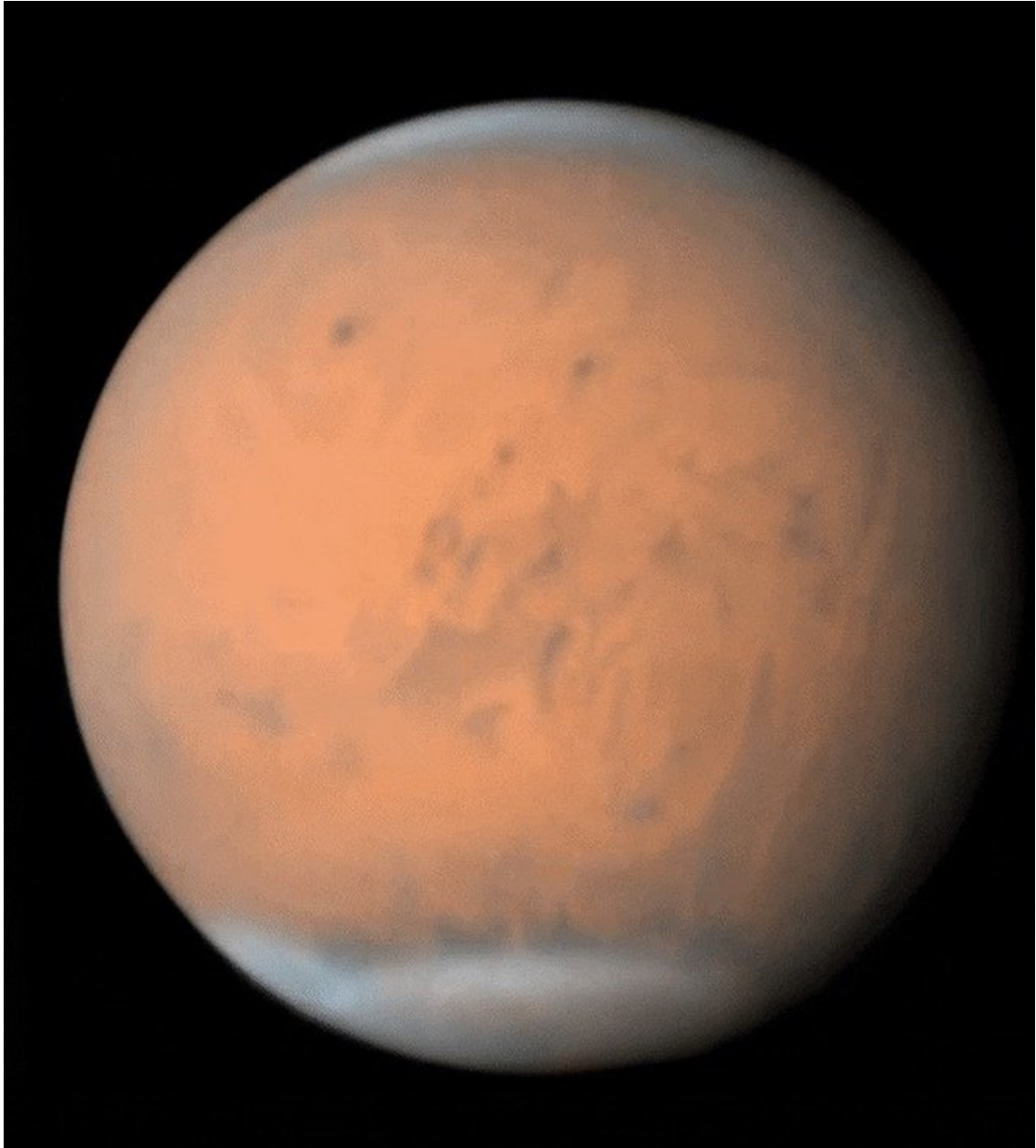
Following this study, the researchers hope to study this collision with even higher-resolution simulations to better understand Uranus' evolution, according to Kegerreis. He also noted that the team aims to study Uranus' chemistry and the different ways that an impact like this could have affected its atmosphere.

Astro Events from Frank Gross

Cont...3

See How Huge the Monster Dust Storm on Mars Is in This Stunning Image

By Mike Wall, Space.com Senior Writer | July 5, 2018 07:37am ET



A frame from the animation created by astrophotographer Damian Peach that shows how a global dust storm has overtaken Mars.

Credit: Damian Peach

If you have a hard time visualizing a planet-wide dust storm on Mars, take a look at this. "I carefully matched them together to show a gradual change of the normal clear view of this hemisphere to how it appears now," Peach added. "It shows the large scale-obscuration due to airborne dust."

Astro Events from Frank Gross

Cont...4

The dust storm began as a localized phenomenon in late May, but it grew incredibly quickly. By the third week of June, the storm had become a planet-circling event, and it continues to rage today. That's a shame for amateur astronomers who had hoped to get a good look at Mars through their telescopes late this month, when the planet makes its closest approach to Earth since 2003.

Currently, the Red Planet's features are "largely lost beneath the dust," Peach said. "It will take at least a couple of months from now for Mars to start to return to a normal appearance — provided further local dust storms do not develop (quite possible as we are now well into the season on Mars where dust events are common)."

The dust storm is also creating issues for NASA's solar-powered Opportunity rover, which has been silent for weeks, unable to recharge its batteries. Opportunity has apparently put itself into a sort of hibernation, turning off everything but its internal clock to conserve energy, mission team members have said.

The rover's handlers have expressed optimism that Opportunity will be able to ride out the dust storm, but their anxiety won't clear until the six-wheeled robot finally phones home once again.

The dust storm is a nuisance rather than an existential threat to NASA's other active Mars rover, Curiosity, which is nuclear powered.

27–28 July 2018 — Total Lunar Eclipse

The second total lunar eclipse of 2018 will be visible in large parts of Australia, Asia, Africa, Europe, and South America. Totality will last for 103 minutes, making it the longest eclipse of the 21st century.



Astro Events from Frank Gross

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Earth Casts Its Shadow

The Moon does not have any light of its own—it shines because its surface reflects sunlight. During a total lunar eclipse, the Earth moves between the Sun and the Moon and cuts off the Moon's light supply. When this happens, the surface of the Moon takes on a reddish glow instead of going completely dark.

The red color of a totally eclipsed Moon has prompted many people in recent years to refer to total lunar eclipses as Blood Moons.

Why Red?

The reason why the Moon takes on a reddish color during totality is a phenomenon called Rayleigh scattering. It is the same mechanism responsible for causing colorful sunrises and sunsets, and for the sky to look blue.

Colorful Sunlight

Even though sunlight may look white to human eyes, it is actually composed of different colors. These colors are visible through a prism or in a rainbow. Colors towards the red part of the spectrum have longer wavelengths and lower frequencies compared to colors towards the violet part of the spectrum which have shorter wavelengths and higher frequencies.

Earth's Atmosphere

The next piece of the puzzle of why a totally eclipsed Moon turns red is the Earth's atmosphere. The layer of air surrounding our planet is made up of different gases, water droplets, and dust particles.

When sunlight entering the Earth's atmosphere strikes the particles that are smaller than the light's wavelengths, it gets scattered into different directions. Not all colors in the light spectrum, however, are equally scattered. Colors with shorter wavelengths, especially the violet and blue colors, are scattered more strongly, so they are removed from the sunlight before it hits the surface of the Moon during a lunar eclipse. Those with longer wavelengths, like red and orange, pass through the atmosphere. This red-orange light is then bent or refracted around Earth, hitting the surface of the Moon and giving it the reddish-orange glow that total lunar eclipses are famous for.

Look for a Blue Band

Veteran eclipse watchers will tell you that if you look really hard right at the beginning and just before the end of totality, you may detect a light blue or turquoise band on the Moon's face (see image). This happens because the Earth's Ozone layer scatters red light and lets through some of the blue light that is otherwise filtered out by other layers of the atmosphere.

Many Shades of Red

The Moon can take on different shades of red, orange, or gold during a total lunar eclipse, depending on the conditions of the Earth's atmosphere at the time of the eclipse. The amount of dust particles, water droplets, clouds, and mist can all have an effect on the shade of red. Volcanic ash and dust in the atmosphere can also lead to the Moon turning dark during an eclipse.

Fun fact: If you were lucky enough to see a total lunar eclipse from the Moon, you'd see a red ring around the Earth. In effect, you'll be seeing all the sunrises and sunsets taking place at that specific moment on Earth!

Astro Events from Frank Gross

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TIMES

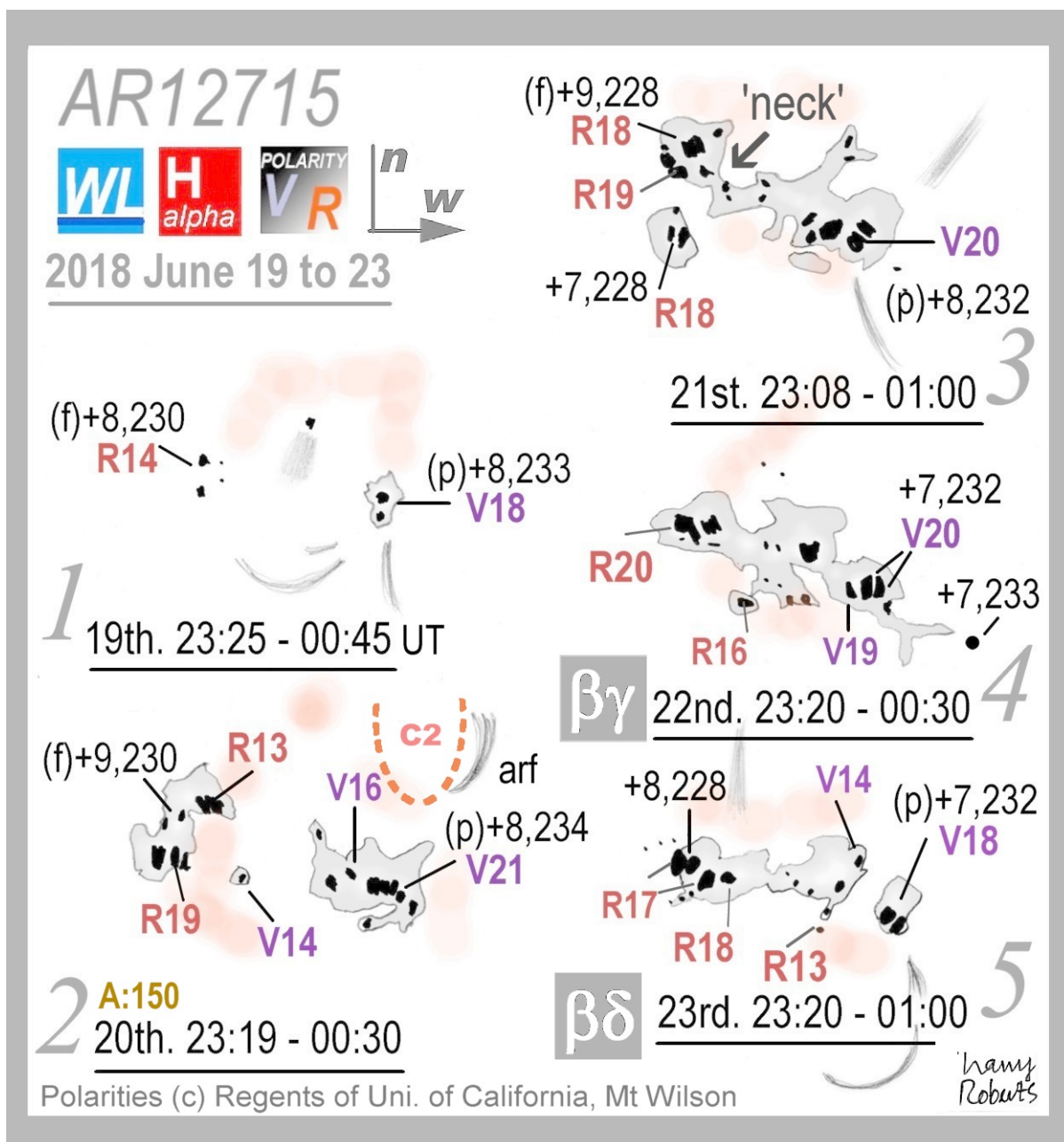
Event	UTC Time	Time in Sydney*	Visible in Sydney
Penumbral Eclipse begins	27 Jul at 17:14:47	28 Jul at 3:14:47 am	Yes
Partial Eclipse begins	27 Jul at 18:24:27	28 Jul at 4:24:27 am	Yes
Full Eclipse begins	27 Jul at 19:30:15	28 Jul at 5:30:15 am	Yes
Maximum Eclipse	27 Jul at 20:21:44	28 Jul at 6:21:44 am	Yes
Full Eclipse ends	27 Jul at 21:13:11	28 Jul at 7:13:11 am	No, below the horizon
Partial Eclipse ends	27 Jul at 22:19:00	28 Jul at 8:19:00 am	No, below the horizon
Penumbral Eclipse ends	27 Jul at 23:28:38	28 Jul at 9:28:38 am	No, below the horizon

AR12715: A Welcome 'Gift'!

Sunwatchers have had 'lean pickings' of late: indeed, there's been little to get excited about for over *nine months*! Back then the extreme 'doings' of AR12673 were even noticed by 'mainstream' media – with reporting of 'great' flares and remarkable ejections.

Since then we've had plenty of time to 'chill'; just 33 tiny spot groups have come and gone over almost a year. "Old hands" grumble about an 'early start' to the next Solar Minimum. Some recall the 'grave' prediction by the Livingston/Penn team (2010) that Solar Cycle 24 (SC24) would be the weakest for a century (it is!) and - that "SC25 might fail to materialise at all!" Dark tidings, indeed!

The shortage of sunspots (i.e. active regions) has been matched by a big drop in the number and power of flares, of ejections, CME's and other such events. As well, quiet region activity has declined too, with large filaments and extensive prominences all but absent.



Solar News By Harry Roberts

Cont...2

What sunspots do occur have been small, magnetically simple structures, with low contrast; all are known affects of weak sunspot fields. When 'spot' or 'umbral fields' drop below 2000G (Gauss) spots lose their encircling penumbra; as fields fall further (<1200G) even the black umbrae fade and the whole spot group seems to disappear.

AR12715. In this context a spot group of some complexity was welcome indeed! On June 20 a patch of bright faculae some 30 deg east of the solar Central Meridian (CM) was seen to hold five small umbrae in a bipolar arrangement (Fig1). The twin preceding (p) spots even had a small penumbra with fields of 'violet polarity' of 1800 and 1500G. Three degrees behind were two 'followers' of 'red polarity' 1400G. Small surges and an active region filament (ARF) were also seen. Incidentally, there were two other small groups on the disc – for a total of three groups; signs of an 'uptick' in activity! What happened next?

Changes & flaring. Next day the little group had grown ten times bigger overnight! Dark penumbra now surrounded the (p) and (f) groups of ten spots (Fig2). Field in the (p) spots (at +9,234) had reached 2100G, with 1900G in the (f) cluster. A little spot between the (p) and (f) groups had V1400G suggesting a complex boundary between the spots; all pointed to likely flaring. And indeed a GOES C2.1 flare erupted at the (p) end of the group, just 45 mins after my H-alpha session ended! (Dotted in Fig2).

Day three saw 'transformation' (Fig3). The whole group had 'welded' itself into a single big penumbra; something few spot groups ever do! When it occurs, the magnetic complexity jumps dramatically; becoming a rare Delta Class group. But there was some disagreement: Mt Wilson saw a gap or 'neck' in the penumbra (Fig3 arrow) just hours before my log.

However, by the 22nd (Fig4) 'everyone' agreed the group was magnetic class Beta-Gamma with spots of opposite sign in a single penumbra (with a simple separation between them) and on the 23rd the group was reclassified as Beta-Delta (complex separation). Delta is a 'license' to emit strong flares! *Anticipation ran high!*

Sadly, after a small B8 flare, the group's fields fell sharply, with none $\geq 2000\text{G}$ after the 23rd (Figs4 to 5); fatal for the penumbra – which all but vanished overnight (and now looked like Fig1 again) while spot umbrae also shrank! While the complex group had been a good excuse to put the 'scope through its 'paces', it also revealed a slender filament in the Sun's NE quadrant. Stretching almost due north the filament lay at longitude 180deg and across some 20deg or so of latitude or 240, 000 km (240Mm). We haven't seen too many of those for quite a while. Sunwatching? It can be very pleasant basking in winter Sun, while the 'scope delivers 'arcsec' images: a joy to behold! Keep the 'scopes ready for action, while enjoying the winter Sun!

(Specs: 'scope C8 white-light and 1.5A H-alpha. Polarities courtesy Regents University of California Mt Wilson).

More Club News continued from page 1

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) but consult Jack first on Landline: 44232255, Mobile:0407 018 982

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

Other Viewing areas may be chosen at different times.

Dates for Club/Social Viewing Nights for 2018 On Saturday Nights As Follows:

Jul-14, Aug-11, Sep-8, Oct-6, Nov-10, Dec-8

More Monthly Meeting Information

The AGM was held at the July 2017 monthly meeting. Elected officials for 2017 - 2018

President: Frank Gross

Vice President: John Gould

Secretary/Treasurer: Tracey Newcombe

Public Officer: Frank Gross

Observation Officer: Robert Turnbull

Editor: Kaye Johnston

Librarian: Chris O'Hanlon

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Jack Apfelbaum, Chris O'Hanlon, John Gould

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 is 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.