JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

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Editorial

Welcome to this month's edition of Janus which contains the usual collection of items, including Gary Walker's collected observations (both his viewing reports and comments on news items), and Martin Howes' object of the month. The image which forms the central focus of Martin's piece is notable in that it was taken during a recent group observing session at Ranmore Common. Perhaps others attending such sessions, either at Ranmore Common or Warren Farm, would, like Martin this month and Christine Beavon in March, care to share their experiences by writing a short report and/or submitting any images taken during the session.

I know that others circulate images they have taken via the EAS WhatsApp group, but not everyone is part of that group and, anyway, putting them into Janus together with a few supporting notes makes them available to a wider audience. The images are also larger!

Another way to make images available for others to enjoy is to place them in one of the galleries on the EAS website. For those who are unaware, there is a page within the website entitled "Galleries" and within this there are 5 galleries: The Sun, The Moon, Solar System, Deep Sky and Nightscapes. Each of these contains a selection of images taken by EAS members and are well worth investigating if you haven't already done so.

Finally, I have included an item this month from "The Conversation" which suggests how building telescopes on the Moon could transform astronomy – there are many potential benefits and, apparently, it's becoming an achievable goal!

John

The Solar System May

MERCURY: begins the month soon passing in front of the Sun at inferior solar conjunction. It will not be readily observable since it is very close to the Sun, at a separation of only 1° from it. It remains very difficult to see throughout the month. Even at the end of the month, emerging into the morning sky as it approaches greatest elongation W, it is difficult to observe, reaching its highest point in the sky during daytime and being 2° below the horizon at dawn.

VENUS: is emerging into the evening sky as it approaches greatest elongation E. It begins the month becoming visible around 20:45 BST, 29° above the W horizon, as dusk fades to darkness, and will then sink towards the horizon, setting at 00:22. By the end of the month, it will become visible around 21:32 BST, 24° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 3 hours and 26 minutes after the Sun at 00:31.

MARS is also currently an early evening object, and begins the month visible from around 21:21 BST, 40° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 02:04. By the end of the month, it will become visible around 22:22 BST, 21° above the W horizon, as dusk fades to darkness, and will then sink towards the horizon, setting 3 hours and 48 minutes after the Sun at 00:53.

JUPITER: recently passed behind the Sun at solar conjunction. It begins the month difficult to see as it will reach its highest point in the sky during daytime and be close to the horizon at dawn. By the end of the month, visibility will have improved, although it will still reach its highest point in the sky during daytime and be no higher than 7° above the horizon at dawn.

SATURN: is currently emerging from behind the Sun. It begins the month difficult to

observe, reaching its highest point in the sky during daytime and being no higher than 7° above the horizon at dawn. By the end of the month, it is visible in the dawn sky, rising at 01:52 BST – 2 hours and 56 minutes before the Sun – and reaching an altitude of 15° above the SE horizon before fading from view as dawn breaks around 03:49.

URANUS: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it will be extremely difficult to see as it will be very close to the Sun, at a separation of only 8° from it. By the end of the month, having recently passed behind the Sun at solar conjunction, it will still be very difficult to see since it will be very close to the Sun, at a separation of only 19° from it.

NEPTUNE: recently passed behind the Sun at solar conjunction. It begins the month very difficult to see, reaching its highest point in the sky during daytime and being 4° below the horizon at dawn. By the end of the month, emerging from behind the Sun, it remains very difficult to see as it will reach its highest point in the sky during daytime and be no higher than 2° above the horizon at dawn.

MOON PHASES:

First Quarter	27 Apr
Full Moon	5 May
Last Quarter	12 May
New Moon	19 May
First Quarter	27 May

Notable Events:

Observation of some of these events may require a telescope, although some will be visible with the naked eye. More information with times at https://in-the-sky.org

May

5 Penumbral lunar eclipse (not visible from London)

6 η-Aquariid meteor shower 2023

7 Lunar occultation of Delta Scorpii

9 η-Lyrid meteor shower 2023

13 Messier 5 is well placed
Close approach of the Moon and Saturn

14 Comet 237P/LINEAR passes perihelion

17 Lunar occultation of Jupiter

23 Close approach of the Moon and Venus

24 Close approach of the Moon and Mars

29 Mercury at greatest elongation west

June

2 The Great Globular Cluster in Hercules is well placed

3 Close approach of Mars and M44
Lunar occultation of Delta Scorpii
Messier 12 is well placed

4 Venus at dichotomy
Mercury at dichotomy
Venus at greatest elongation East

6 Asteroid 11 Parthenope at opposition
Messier 10 is well placed

9 Close approach of the Moon and Saturn

10 Mercury at highest altitude in morning sky

11 Daytime Arietid meteor shower 2023
Messier 92 is well placed

14 Close approach of Venus and M44
Close approach of the Moon and Jupiter

17 Saturn enters retrograde motion

18 The cluster IC 4665 is well placed

21 June Solstice

22 Close approach of the Moon and Venus
Close approach of the Moon and Mars

23 The Lagoon Nebula is well placed

27 June Bootid meteor shower 2023

29 The cluster NGC 6633 is well placed

30 Neptune enters retrograde motion
Lunar occultation of Delta Scorpii

Collected Observations (and thoughts) – Gary Walker

A very cloudy March – 1 Apr

March has been a dreadful month for observing, with mostly cloudy days and nights. I only managed to observe the Sun on a total of 13 days in March – that said, January and February, weren't much better, with me only observing the Sun on 16 and 18 nights, respectively, in those 2 months!

Admittedly, this period was nearly all in the winter, but it was still very poor, and very frustrating!

Latest Observations – 2 Apr

The endlessly cloudy skies finally cleared during 2nd April, and I could finally carry out some observations after an awful March!

On the early evening of 2nd April, I saw both Venus and Mercury in the sky, and Mercury was even visible with the naked eye!

As usual, Mercury was far lower in the sky than Venus. Through my telescope I could see that both planets had the same phase. According to astronomical sources, both planets were about 77% phase. However, their angular sizes varied, with Mercury at only 6' arcseconds, whilst Venus was over twice its size at 14' arcseconds.

In other observations, I saw that the Sun had only one small spot on it, a situation that has not been seen for a long time now!

Having now shrunk down to only about 6' arcseconds in size, Mars still appeared tiny, even at 222X. Its magnitude had also dropped significantly since Opposition last December- 4 months ago. I judged it to be about the same magnitude as Aldebaran, (which is about magnitude 0.86), but Betelgeuse was now significantly brighter (about magnitude 1).

Coincidentally, Mercury was about the same size as Mars, also about 6' arcseconds in size. I could see Mercury's phase reasonably clearly, but it always appeared tiny, even at high powers.

Mercury is always well seen in early spring in the early evening sky - the best time to see it. At this time, it can be clearly visible to the naked eye, as it can reach the 1st magnitude, but Mercury, as the closest planet to the Sun, is notoriously elusive, so has usually to be observed in a twilight sky. Being the closest planet to the Sun also means that it orbits fast, and is never in the same place for long, which is why the Romans knew it as the Messenger of the Gods!

Its phase goes rapidly from gibbous to crescent in a week or two, and its magnitude also drops from magnitude 1 to magnitude 4 in this same period! Its angular size is always small, between 6' arcseconds and a maximum of 10' arcseconds, so this makes observation difficult. As it is so small, and usually seen low down in turbulent air, it means that observing any surface detail is incredibly difficult! However, both visual observation and imaging of the planet have shown faint dark markings and even craters!

Usually, I cannot see any detail upon it, but several times in 2009, I could see a white patch on it, but I couldn't tell whether it was genuine, or just a contrast effect.

On 2nd – 3rd April, I could see it, with Venus appearing marvellously brilliant well above it!

Virgin Orbit in trouble – 4 Apr

After the failure to launch a rocket from Newquay on 10th January, it has been announced that Richard Branson's "Virgin Orbit" company, having failed to secure new funding, is shedding 85% of its staff. Thus, further launches from Newquay do not seem likely to happen any time soon! In addition, Virgin Orbit has filed for bankruptcy, and suspended all operations in March.

Spaceport Cornwall has announced that they are working with other firms, and possibly something may come of this.

More on Mercury – 19 Apr

I was still seeing Mercury as late as 19th April. I first saw it in this present "apparition" on 2nd April, so I have now seen it over a period of 17 days. Surprisingly, it still appeared bright in both binoculars and my telescope (at about magnitude 1.32 on the 19th). It was now officially in a crescent phase but, due to the usual turbulence of the atmosphere when low down, it always means that the phase is hard to pick out well. It still appeared like a blurry "blob" but, occasionally, I could see the phase.

On the 19th, Mercury was 9.4' arcseconds in angular size, which is big for Mercury! Even at maximum it never gets larger than 12' arcseconds in size. The only times that one can see it at that size is when Mercury transits the Sun. Consequently, Mercury always appears small in my telescope even at 222X magnification.

The Solar Eclipse and Launch of the SpaceX Super Heavy Starship – 20 Apr

A rare event occurred on 20th April (and not only the hybrid total - annular solar eclipse over Western Australia and Indonesia!); the launch (and subsequent explosion) of the SpaceX Heavy Starship. The rare element in this launch was that it made the top item of the BBC 6pm News! It is very rare for any astronomical event to top the news – I can only recall a few other events such as Apollo 11 and 13 attracting such notable coverage!

The total solar eclipse of 11th August 1999 also made the top item of the News that day!

Usually, any astronomical news is invariably the final news item of the main news, (as indeed was the report on the hybrid solar eclipse on the 20th). However, for once, even that report was quite a decent report in length. In a splendid example of an understatement, the rocket's demise was reported as "a rapid, unscheduled, disassembly"!

The solar eclipse was unusual and was known as a hybrid eclipse because it is total along part of the track, and annular at each end, as the Moon was just slightly further away, so that it could not completely obscure the Sun at all points! Observers could, of course, only see either the total, or the annular versions!

Typically enough for a total eclipse, the track went over the most awkward and remote areas, just clipping part of Western Australia, the Southern Indian Ocean and part of Indonesia! Friends of mine, who had been staying in Darwin, unfortunately missed this eclipse as they came home the previous day!

The solar eclipse was only featured in two of the national newspapers, no doubt because of its remoteness. However, the Times did a good article with 3 photographs, whilst the "i" newspaper did a smaller article.

All papers, however, covered the explosion of the SpaceX Starship!

The news stated repeatedly about the "rare hybrid eclipse" which was accurate for once!

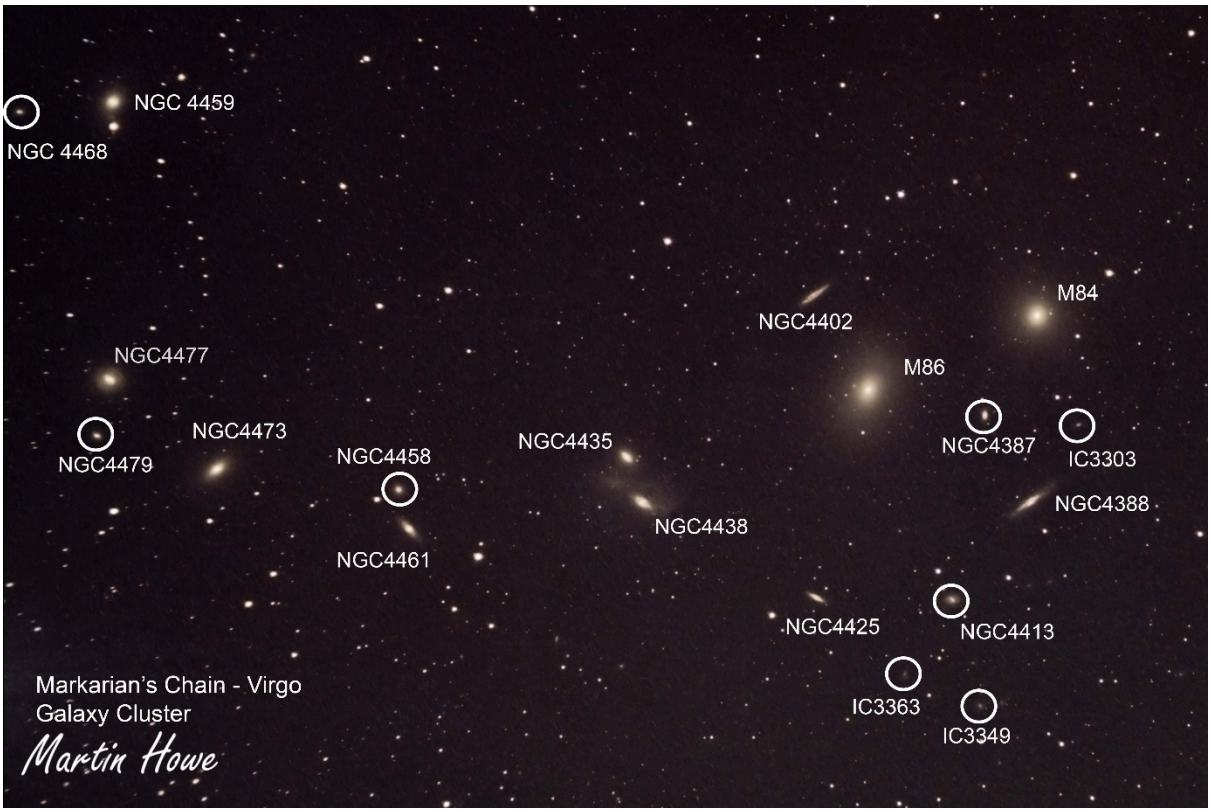
Object of the month – The Virgo Cluster and Markarian's Chain – Martin Howes

Our galaxy forms a (small) cluster of galaxies, known as the Local Group, with the three main members being our galaxy, the Andromeda galaxy, and the Triangulum galaxy, plus dozens of dwarf galaxies. By comparison, the Virgo galaxy cluster is a huge cluster of some 2,000 galaxies, and is a prominent hunting ground for searching out galaxies in the late spring sky. Within the cluster there is also a chain of eight galaxies forming an arc, known informally as Markarian's Chain, named after Benjamin Markarian who identified that these eight galaxies had a common motion. These galaxies are about 50 million light years away (the Andromeda galaxy is a mere 2 million light years away).

The members are mainly elliptical galaxies. Two of the galaxies, in the centre of the chain, are interacting with each other and are known as Markarian's eyes – NGC 4435 and NGC 4438. The cluster spans a distance of about 1½°, or the width of three full Moons, but with the brightest member (M86) having a magnitude of +8.9 means that even with a good pair of binoculars from a dark sky site you would be very lucky to pick this galaxy out. A moderate sized telescope should be able to spot a number of these 'fuzzy blobs', but long exposure photography would be the best was to capture these. And in fact, given the large area of sky covered by the chain, a small to medium-sized telescope with a wide field of view would be ideal. The chain is located in a region of sky rather bereft of bright stars, so can be difficult to locate without the aid of a GoTo telescope. To track it down manually, the best approach would be to look halfway between the two relatively bright stars Denebola (+2.1, at the tip of Leo's tail) and Vindemiatrix (+2.85) in Virgo.

The image below was taken from Ranmore Common, on our viewing session of 19th April 2023, with a 71mm diameter refractor, and is a combined image made up from 28 separate exposures ranging from 2 minutes to 5 minutes (the exposures were lengthened as the evening progressed and the skies darkened further).
The eight members of Markarians Chain are, right-to-left, M84, M86, NGC 4435, NGC 4438, NGC 4458, NGC 4461, NGC 4473, and NGC 4477.

All of the other galaxies annotated on the image are part of the wider Virgo Cluster. There are also many more even fainter galaxies within this region of sky which this image did not pick up!



Building telescopes on the Moon could transform astronomy – and it's becoming an achievable goal

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Lunar exploration is undergoing a renaissance. Dozens of missions, organised by multiple space agencies – and increasingly by commercial companies – are set to visit the Moon by the end of this decade. Most of these will involve small robotic spacecraft, but NASA's ambitious Artemis programme, aims to return humans to the lunar surface by the middle of the decade.

There are various reasons for all this activity, including geopolitical posturing and the search for lunar resources, such as water-ice at the lunar poles, which can be extracted and turned into hydrogen and oxygen propellant for rockets. However, science is also sure to be a major beneficiary.

The Moon still has much to tell us about the origin and evolution of the solar system. It also has scientific value as a platform for observational astronomy.

The potential role for astronomy of Earth's natural satellite was discussed at a Royal Society meeting earlier this year. The meeting itself had, in part, been sparked by the enhanced access to the lunar surface now in prospect.

Far side benefits

Several types of astronomy would benefit. The most obvious is radio astronomy, which can be conducted from the side of the Moon that always faces away from Earth – the far side.

The lunar far side is permanently shielded from the radio signals generated by humans on Earth. During the lunar night, it is also protected from the Sun. These characteristics make it probably the most "radio-quiet" location in the whole solar system, as no other planet or moon has a side that permanently faces away from the Earth. It is therefore ideally suited for radio astronomy.

Radio waves are a form of electromagnetic energy – as are, for example, infrared, ultraviolet and visible-light waves. They are defined by having different wavelengths in the electromagnetic spectrum.

Radio waves with wavelengths longer than about 15m are blocked by Earth's ionosphere. But radio waves at these wavelengths reach the Moon's surface unimpeded. For astronomy, this is the last unexplored region of the electromagnetic spectrum, and it is best studied from the lunar far side.

Observations of the cosmos at these wavelengths come under the umbrella of "low frequency radio astronomy". These wavelengths are uniquely able to probe the structure of the early universe, especially the cosmic "dark ages" – an era before the first galaxies formed.

At that time, most of the matter in the universe, excluding the mysterious dark matter, was in the form of neutral hydrogen atoms. These emit and absorb radiation with a characteristic wavelength

of 21cm. Radio astronomers have been using this property to study hydrogen clouds in our own galaxy – the Milky Way – since the 1950s.

Because the universe is constantly expanding, the 21cm signal generated by hydrogen in the early universe has been shifted to much longer wavelengths. As a result, hydrogen from the cosmic "dark ages" will appear to us with wavelengths greater than 10m. The lunar far side may be the only place where we can study this.

The astronomer Jack Burns provided a good summary of the relevant science background at the recent Royal Society meeting, calling the far side of the moon a "pristine, quiet platform to conduct low radio frequency observations of the early Universe's Dark Ages, as well as space weather and magnetospheres associated with habitable exoplanets".

Signals from other stars

As Burns says, another potential application of far side radio astronomy is trying to detect radio waves from charged particles trapped by magnetic fields – magnetospheres – of planets orbiting other stars.

This would help to assess how capable these exoplanets are of hosting life. Radio waves from exoplanet magnetospheres would probably have wavelengths greater than 100m, so they would require a radio-quiet environment in space. Again, the far side of the Moon will be the best location.

A similar argument can be made for attempts to detect signals from intelligent aliens. And, by opening up an unexplored part of the radio spectrum, there is also the possibility of making serendipitous discoveries of new phenomena.

We should get an indication of the potential of these observations when NASA's LuSEE-Night mission lands on the lunar far side in 2025 or 2026.

Crater depths

The Moon also offers opportunities for other types of astronomy as well. Astronomers have lots of experience with optical and infrared telescopes operating in free space, such as the Hubble telescope and JWST. However, the stability of the lunar surface may confer advantages for these types of instruments.

Moreover, there are craters at the lunar poles that receive no sunlight. Telescopes that observe the universe at infrared wavelengths are very sensitive to heat and have, therefore, to operate at low temperatures. JWST, for example, needs a huge sunshield to protect it from the sun's rays. On the Moon, a natural crater rim could provide this shielding for free.

The Moon's low gravity may also enable the construction of much larger telescopes than is feasible for free-flying satellites. These considerations have led the astronomer Jean-Pierre Maillard to suggest that the Moon may be the future of infrared astronomy.

The cold, stable environment of permanently shadowed craters may also have advantages for the next generation of instruments to detect gravitational waves – "ripples" in space-time caused by processes such as exploding stars and colliding black holes.

Moreover, for billions of years the Moon has been bombarded by charged particles from the sun – solar wind – and galactic cosmic rays. The lunar surface may contain a rich record of these processes. Studying them could yield insights into the evolution of both the Sun and the Milky Way.

For all these reasons, astronomy stands to benefit from the current renaissance in lunar exploration. In particular, astronomy is likely to benefit from the infrastructure built up on the Moon as lunar exploration proceeds. This will include both transportation infrastructure – rockets, landers, and other vehicles – to access the surface, as well as humans and robots on-site to construct and maintain astronomical instruments.

But there is also a tension here: human activities on the lunar far side may create unwanted radio interference and plans to extract water-ice from shadowed craters might make it difficult for those same craters to be used for astronomy. As my colleagues and I recently argued, we will need to ensure that lunar locations that are uniquely valuable for astronomy are protected in this new age of lunar exploration.

Important Note:

To allow sufficient time to compile Janus and place it on the EAS Website by the 1st of the month any submissions for publication are required at least 3 days before the end of the month. Any items received after this date will be held over until the following month.

Up Next:

NEXT MEETING: 8pm Friday 12 May – Nonsuch High School

Michael Foulkes from UCL will give a talk entitled "Saturn which provides an overview of the planet".

Ron Canham or Ron Johnson will also give a presentation on the sky at night for the coming month.

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

The next session, allowing for moon rise & set times and cloud conditions, should be sometime around the new moon on 19 May.

The precise date and timings of any session will be advised by email and WhatsApp a few days in advance but should be within the period 9-20 May.

AD HOC OBSERVING AT WARREN FARM:

These will be at short notice when the weather is favourable. Please watch our WhatsApp feed for alerts