JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

FEBRUARY 2025

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Important Reminder:

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.

Editorial

Welcome to the February edition of Janus – the first one of 2025 – so let me (belatedly) wish all our readers a Happy New Year.

We have, of course, already had our first meeting of the year a couple of weeks ago, and our next meeting will be on 14 February when Neil Phillipson, the former owner of Astronomia, will give a talk entitled “The New Space Race and the Solar System”.

This month’s Janus is slightly larger than usual, partly to include 2 months’ worth of input from Gary Walker, but also to include an interesting piece from a new contributor, John Pillar, as well as the now customary item from Martin Howe, and details of some items for sale. I hope you enjoy it.

I was unable to attend last month’s meeting, but those who did will have heard from Ron Johnson the stark details of how poor 2024 was from the perspective of available opportunities for making observations. The full details from Ron’s presentation are included in this issue - suffice to say, since Ron began his records in 1969, last year contained the least clear nights (27), and the number of useable nights (108) was only 18 better than the lowest figure (90), which was recorded in 1987. A truly gloomy year in every sense of the word. Let’s hope that 2025 re-dresses the balance!

In that vein, after a further spell of indifferent weather, at least for some, there were several clear nights during the second half of January which allowed the potential viewing of up to 6 planets at once – Venus, Saturn, Jupiter, Mars, Uranus and Neptune. This “Great Planetary Parade” was much spoken about in the media, but it’s not clear how many members actually got to see it – I, for one, didn’t!

Now, an appeal for help. Members will be aware that the committee has been exploring options for siting an observatory (the Maurice Gavin Observatory) which would house the telescope purchased by the Society on Maurice’s death. The observatory would be for the use of EAS members and would provide an alternative to the telescope on the roof of Nonsuch School.

It is obvious that, regardless of where the observatory is sited, funding will be required for its construction. Although the Society has some funds available, these are unlikely to be sufficient to cover all the costs, so it will be necessary to raise the difference – possibly several thousand pounds. The committee would therefore be pleased to hear from any members who have experience of fundraising activities of this magnitude.

John

skyUpdate
What's up this month?

The Solar System February

MERCURY: begins the month soon passing behind the Sun and is very difficult to see, reaching its highest point in the sky during daytime and being 3° below the horizon at dawn. Visibility improves during the month and, by the end of the month, having recently passed behind the Sun at superior solar conjunction, it becomes visible at around 17:59 GMT, 8° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 1 hour and 19 minutes after the Sun at 18:57.

VENUS: begins the month visible as an evening object, having recently passed greatest elongation E. Becoming visible at around 17:12 GMT, 31° above the SW horizon, as dusk fades to darkness, it will then sink towards the horizon, setting at 21:05. By the end of the month, it will soon pass in front of the Sun at inferior solar conjunction. It will become visible at around 17:59 GMT, 25° above the W horizon, before sinking towards the horizon, setting 3 hours and 11 minutes after the Sun at 20:49.

MARS: recently passed opposition, and begins the month visible in the evening sky, becoming accessible around 17:12 GM), 24° above the E horizon, as dusk fades to darkness. Reaching its highest point in the sky at 22:41, 64° above the S horizon, it will continue to be observable until around 06:06, when it sinks below 7° above the NW horizon. By the end of the month, visible in the evening sky, it becomes accessible around 18:08 GMT, 51° above the SE horizon. Reaching its highest point in the sky at 20:39, 64° above the S horizon, it will continue to be observable until around 03:53, when it sinks below 9° above the NW horizon.

JUPITER: is currently an early evening object, and begins the month visible in the evening sky, from around 17:12 GMT, 47° above the SE horizon, as dusk fades to darkness. Reaching its highest point in the sky at 19:49, 60° above the S horizon, it will continue to be observable until around 02:48, when it sinks below 7° above the NW horizon. By the end of the month, still an early evening object, but now receding into evening twilight, it becomes accessible around 17:59 GMT, 60° above the S horizon. It will reach its highest point in the sky at 18:07, 60° above the S horizon and continue to be observable until around 01:07, when it sinks below 7° above the NW horizon.

SATURN: will soon pass behind the Sun at solar conjunction. It begins the month visible from around 17:39 GMT, 18° above the SW horizon, but will then sink towards the horizon, setting 3 hours and 8 minutes after the Sun at 19:57. By the end of the month, it is very difficult to not observe as it will reach its highest point in the sky during daytime and be 0° above the horizon at dusk.

URANUS: is currently an early evening object, now receding into evening twilight, and begins the month becoming accessible around 18:12 GMT, 56° above the S horizon, as dusk fades to darkness. It will then reach its highest point in the sky at 18:34, 56° above the S horizon, and will continue to be observable until around 23:47, when it sinks below 21° above the W horizon. By the end of the month, it will become visible at around 18:57 GMT, 48° above the SW horizon, before sinking towards the horizon, setting at 00:31.

NEPTUNE: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it will become visible at around 18:12 GMT, 23° above the SW horizon, before sinking towards the horizon and setting at 20:58. By the end of the month it is extremely 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 dusk.

Notable Events:

Some observations will require a telescope, others will be visible with the naked eye. More information at https://in-the-sky.org

February

1 Conjunction of the Moon and Saturn
Close approach of the Moon and Venus

2 The Moon at perigee

3 Conjunction of Venus and Neptune

4 Jupiter ends retrograde motion

5 Moon at First Quarter

6 Close approach of the Moon and M45

7 Venus at highest altitude in evening sky
Close approach of the Moon and Jupiter
Lunar occultation of Beta Tauri
NGC 2808 is well placed

8 α-Centaurid meteor shower 2025

9 Mercury at superior solar conjunction
Close approach of the Moon and Mars
Lunar occultation of Mars

12 Full Moon
Asteroid 29 Amphitrite at opposition

14 The Moon at aphelion
1 Ceres at solar conjunction

16 Venus at greatest brightness

17 Lunar occultation of Spica

18 The Moon at apogee

19 Venus at perihelion
Messier 81 is well placed

20 Moon at Last Quarter
The cluster NGC 3114 is well placed

21 Lunar occultation of Antares

24 Mars ends retrograde motion

25 Conjunction of Mercury and Saturn
The Moon at perihelion

27 The cluster IC 2581 is well placed

28 New Moon

March

1 Close approach of the Moon and Mercury
Lunar occultation of Mercury
The Moon at perigee
Conjunction of the Moon and Venus

3 Conjunction of Mercury and Neptune
The Theta Carinae cluster is well placed

4 Mercury at perihelion

5 Close approach of the Moon and M45

6 Close approach of the Moon and Jupiter
Moon at First Quarter

7 Lunar occultation of Beta Tauri
Mercury at dichotomy

8 Mercury at highest altitude in evening sky
Mercury at greatest elongation east
The Wishing Well cluster is well placed

9 Close approach of the Moon and Mars
Conjunction of Venus and Mercury

12 Saturn at solar conjunction
Asteroid 8 Flora at opposition

14 Full Moon
Total lunar eclipse
γ-Normid meteor shower 2025

16 Lunar occultation of Spica

17 The Moon at aphelion
The Moon at apogee

19 Neptune at solar conjunction

20 March equinox
Lunar occultation of Antares

22 Moon at Last Quarter

23 Venus at inferior solar conjunction
Saturn ring plane crossing

24 Mercury at inferior solar conjunction

25 Comet 21P/Giacobini-Zinner passes perihelion
1 Ceres at aphelion

27 The Moon at perihelion

28 Conjunction of the Moon and Saturn

29 Partial solar eclipse
New Moon

30 The Moon at perigee

31 136472 Makemake at opposition

Collected Observations (and thoughts) – Gary Walker

The Solar System 50 years ago – Posted 3 December

Over 50 years ago, 1974 started with the much-anticipated Comet Kohoutek, which some thought would be as bright as the Moon. It basically turned out to be a "flop" for the general public, and I never managed to see it!

In February 1974, Sir Patrick Moore was caught by Eamonn Andrews for the "This Is Your Life " TV programme!

Exploration of the Solar System by space probes continued and, in March 1974, the American probe, Mariner 10, became the first probe to approach, and fly past, Mercury, obtaining some good images, showing its cratered nature.

This probe also passed close to Venus and Mars and obtained some good photographs of the Venus clouds.

Pioneer 10 had already passed by Jupiter the previous December, and Pioneer 11 passed Jupiter in December 1974. These two probes were the first ones ever to reach Jupiter and return photographs and measurements of the Jovian System.

Sir Patrick Moore termed 1974, "The Year Of The Planets"!

The outer planets had to wait until the end of the 1970's, and into the 1980's, to receive their "close up"!

Shadow Transit of Io – Posted 3 December

This evening, between about 9pm and 11pm, I observed the Moon, Io, perform a shadow transit of Jupiter. The shadow appeared as a black dot, moving "along" the Southern Equatorial Belt of Jupiter. Once the shadow transit was over, I could see Io itself which, having just moved off the disk of Jupiter, remained very close to it!

As Jupiter is now close to Opposition, it means that the shadow of the moon is very close to the actual moon also transiting Jupiter at the same time. The moons themselves are always difficult to see against the disk of Jupiter, and I have never managed to actually see them transiting Jupiter. The shadows that they cast are, however, much easier to see!

Saturn's rings are now nearly edge on to us, which means that some of its moons can also transit that planet. So far, I have not managed to see one, but as Saturn is much more distant, such transits would be more difficult to see. In any case, Saturnian moon transits are much rarer than Jovian ones!

More Anticyclonic Gloom – Posted 13 December

It will be obvious to Society members that the weather in December, so far, has been abysmal for observing! After Storm Darragh, we have entered another period of high pressure stuck over the UK. Unfortunately, this is not good news at this time of year, as the anticyclones tend to fill in with clouds - as is the case, at present. It has been called "Anticyclonic gloom"!

I have not been able to see the comet since 29 November, or the Sun since 6 December. The only observation that I have managed to make recently is that of Jupiter on 3 December.

Last month, we had nearly 2 weeks of the same dull, overcast weather!

For some days the Sun has not been visible, even as a faint glimmer of light. I was therefore surprised to see the Full Moon, tonight, shining quite brightly for a while. There must have been a thinning of the cloud for a while - however, it soon reverted to a thick overcast!

The BBC Weather said that the cloud base was only 180 metres (about 590 feet) above the ground so, in London, the tops of the Shard and the Gherkin buildings were hidden in the clouds. The Shard is just over 1000 feet tall, whilst the Gherkin is 591 feet tall. Hence, the Gherkin would have been just tall enough to piece the cloud base!

Estimating the height of any clouds in the sky is always very difficult, because you get no sense of scale to them. Obviously, the opaque clouds like Cumulus, Stratus, and Stratocumulus will be only a few thousand

feet in altitude, whilst Cirrus cloud can be at about 25,000 feet high. Clouds can look fairly low in altitude whereas, in reality, they may be higher than you think! Fast moving, "scudding clouds" of cumulus, are probably only a few hundred feet, up! Only when you can see clouds against tall objects like mountains, or tall buildings of a known height, if the clouds are hiding the tops of these objects, can you get a much more accurate assessment of their altitude!

The AGM – Posted 14 December

As usual, the December meeting was the AGM, so there was no public speaker. Being an AGM, it doesn't attract as many people as a regular meeting and, tonight, there were only 23 physically attending, plus 3 more on Zoom!

Anita was wearing a nice smart Christmas jumper, with Christmas lights on it! which enhanced the festive feel!

Unsurprisingly, the main topic of conversation amongst everybody was the continuing, awful cloudy weather!

Ron Johnson gave the "Sky at Night" segment, and then we had the AGM business to deal with.

There were refreshments laid out on a table comprising various hot drinks, mince pies and cup-cakes – kindly made by Casper's wife!

Then, we had the Quiz, but it was one with a difference - instead of having question sheets hung up around the walls, we had a quiz on the same format as the one we had in October 2023. We were divided into 4 teams and each team, in turn, was asked a question, and if they couldn't answer it, it was passed on to the other teams.

Finally, we had the Raffle! However, after a time, there came the usual ridiculous situation of the same raffle winners winning again and again, some at least, 3X, or more! In the end, as there were still 2 unclaimed prizes left, and for virtually every ticket that came up, it was someone who had already won, with time running out, Anita gave the last 2 prizes to me and someone else, as I had, (unusually!) not won anything, and neither had the other man!

Huge Solar Prominence and Mars– Posted 14 December

Today, after at least a week with no Sun even remotely visible, the sky actually cleared. I was rewarded with the sight of a huge, spectacular, arching Prominence on the Eastern limb of the Sun - a site not often seen!

We also had a clearish evening, so I had a look at Mars. There was a Full Moon nearby, so I could compare the size of the naked eye Moon with the size of Mars in my telescope at different magnifications. At 300X, Mars appeared about half the size of the naked eye Moon, and at 490X, Mars appeared about the same size, or a bit larger! Mars was at 12.9' arcseconds, in angular size.

I could just about discern dark features on Mars, as several dark patches, or a linear dark feature. On checking the "Sky & Telescope" Mars Profiler Tool, (after my observation!) the features were Mare Cimmerium and Mare Tyrrhenum, which do compose a long, dark, linear feature across the planet!

In addition, The Moon and Jupiter made a spectacular naked eye conjunction, with the two bodies being about 6 degrees apart.

Parker Solar Probe – Posted 24/27 December

A very rare event occurred on 24 December, when the subject of the Parker Solar Probe was THE Top Story on the evening BBC News!

The probe is passing closer to the Sun than anything has before, at a closest distance of only 3.8 million miles from the Sun's surface! Temperatures will reach about 1,500°C, so it must have the world's largest umbrella, for a heat shield!

Of course, this must be about the harshest space environment in the solar system; apart from the high temperature, the space probe will be bombarded by heavy radiation from the Sun!

At this distance, it will pass through the solar Corona, whose temperature of millions of degrees is still a mystery.

It is also the fastest space probe, at 430,000 mph, and this speed would get you from London to New York in 30 seconds!

This probe was launched in 2018, and has made several orbits ever closer to the Sun. It was expected to be out of contact with Earth for a few days, until 28 December, with everyone hoping that it wouldn't come back as a cinder!

Happily, on the BBC News at lunchtime on 27 December, it AGAIN made the Top Story with the announcement that a signal had been received from it, indicating that it had, indeed, survived its close passage with the Sun! It was still the top story on the evening BBC News, which is gratifying, unless it was just because it was a slow news day!

The dreadful weather continues – Posted 27 December

The really poor weather conditions persist, as we are under yet another Anticyclonic system, with continuously overcast skies and stagnant air. Astronomical observations have been impossible and, even in the case of the Sun, as of today, I have only managed to observe the Sun on 12 days this month! Night sky observations have been even rarer. I tried once to see if I could see the comet, but I think that it is well and truly finished, having now faded to magnitude 10.

T Corona Borealis – Posted 30/31 December

On the BBC News, today, there was a report of the Recurrent Nova of T Corona Borealis, apparently about to explode. This item gave the impression that it was already exploding, or just about to! However, this seems to be a typical "click bait" article, as no-one is sure WHEN, precisely, it will explode!

T Corona Borealis is a double star, consisting of a Red Giant and a White Dwarf star orbiting each other. The strong magnetic pull of the White Dwarf pulls off material from the Red Giant star, onto its surface, and, after a certain amount of time, a thermonuclear explosion occurs, hence the Nova!

It does seem to explode about every 80 years, but the precise date isn't known - it is never exact, but last did so, in 1946.

Michael Woodman, who was only 15 years old at the time, proved to be the first person to see it, when he reported his observation to the Astronomer Royal, Sir Harold Spencer Jones. Now 94 years old, he is hoping to see it again!

This star is normally about magnitude 10, so needs a small telescope to see it but, when it does erupt, it can reach naked eye visibility, up to magnitude 2!

Since the date of the eruption is unpredictable, it could, literally, be any night now, or at sometime during the next two years! For some reason, the BBC News thought that its explosion was imminent; presumably, it must have been a "slow news day", again! This story occasionally repeats on social media and mainstream media, somewhat like speculating when the Yellowstone Super Volcano is next due to erupt! Similarly, predicting how bright a comet will appear, how a meteor shower will behave, or when Betelgeuse will go supernova, is impossible!

The only astronomical events that can be accurately predicted are eclipses, the movements of the planets, the Moon and the Sun, and what their position, magnitudes and angular size will be at any given point in time. Only, these, will do "exactly what it says on the tin"!

First Observations of 2025 – Posted 2 January

Tonight, I made the first observations of the New Year. This was because the sky finally cleared at about 11.30pm!

I had a look at Mars, and could pick out several dark features upon it, as well as the North Polar Cap shining quite brilliantly. According to the Sky and Telescope Mars Profiler Tool, these were Mares Acidalium, Erythraeum and Sirenum. Now only two weeks to Opposition on 16 January, it was 14.3' arcseconds in size. Unfortunately, this is not a particularly good opposition, as Mars is passing further away, than at its closest, when it can get up to 25' arcseconds in size.

I also looked at Jupiter, and found that it was still sharp at 300X, indicating that it must have been a transparent night, as usually I

find that 222X is the highest usable power before it collapses into a blurry mess!

Incidentally, at the Hogmanay Party on BBC 2, I saw Dame Maggie Aderin-Pocock was present. Sadly, the MC went up to her and was talking some nonsense about Aliens! A year ago, she had just been made a Dame in the New Year's Honours List. Maggie is, of course, the main presenter of The Sky at Night.

Earlier in the afternoon, I saw Venus through my telescope. It appeared to be at half phase, which is close to its actual (official) phase of just over 50%. Again, I could see dark shading spreading out from the terminator.

Returning to the awful weather conditions over the last few weeks, I only managed to observe the Sun on 13 days in December, and on several days, the Sun was never visible at all.

There was further strong Aurora on 1 January, with the possibility of more to come over the weekend. Today, I could see upon the Sun a "chain" of small to medium sized sunspots going right across the Sun.

Latest Observations – Posted 4 January 2025

Last night, there was a beautiful Conjunction of the Moon and Venus. As the sky was, for once, clear, it was well seen and has appeared in social media sites, including the BBC Sky At Night Facebook site.

Venus was about 2 degrees to the North of the Moon. This was one instance when the naked eye provided the best view if it!

Earlier, at about 3pm, I could see Venus with the naked eye, as it was so close to the Moon, so my eyes would "fix" and focus on the Moon, thus Venus would be seen, as well.

I saw that the variable star, Mira, was slightly brighter than a magnitude 9 star close to it, so it is still near minimum. I could just pick out the orange tint of it.

Jupiter has been very high in the sky in the evenings and, yesterday, I saw the Great Red Spot. It was not particularly easy to pick out, but I could see that it was a reddish-brown colour.

On the previous night, I saw a shadow Transit of Io, moving "along" the Southern Equatorial Belt.

In the News on 3-4 January, there was a mention of the Quadrantids meteor shower. The weather normally precludes this shower being seen at this time of the year.

Last night, my GOTO again refused to work in the freezing conditions, so I had to do all my observations manually!

Mars – Posted 12 January

Approaching Opposition on 16 January, Mars reached its closest point to Earth today. It is now at its maximum size for this apparition, at only 14.6' arcseconds, which is far short of the 25' arcseconds maximum size that it can reach at its closest oppositions.

Even at 300X, Mars was still smallish, smaller than nearby naked eye gibbous Moon. However, I could easily see dark albedo features on it, Mare Acidalium, and Sinus Meridiani. The North Polar Cap was shining brilliantly! I could still just see these features at 100X, but not at 62X.

I saw Venus in the early afternoon around 1pm, now appearing as a half phase, with “horns” at the top and bottom of the terminator.

As it was daytime, I couldn’t use the GOTO by lining up on stars, so I just set it to go to no stars alignment. I then put the coordinates of the Sun in my "User" area, and got that in the field of view, (putting the solar filters on first!). I then did the same for Venus and, like last week, managed to find it.

The usual method of just sending the telescope to Venus in the" Solar System" part of the GOTO never seems to get anywhere near Venus, so I have often found that it was impossible to find it in my telescope in the daytime. However, with this new modification to the method, I seemed to get better results!

Unfortunately, once again, the very cold temperatures meant my GOTO wasn't

functioning properly, as the batteries don't work very well in these conditions!

As Ron Johnson noted at the meeting last night, we have got off to a good start this year, having experienced several frosty, clear, days and nights. I wasn't surprised to hear him show how awful last year's viewing was, especially in February, March, October, November, and December!

The Astronomical Year in 2024 – Posted 13 January

Not only did America and Japan, land on the Moon last year, but China also did! In June, they put a lander called Chang 6 on the far side of the Moon and recovered some material to return to Earth!

Analyses showed that this material was lacking radioactive elements called KREEP. This may explain why, despite the material being composed of basalt, the far side of the Moon is lacking in lunar mare. Nonetheless, it is a mystery as to how volcanism kept going on the far side!

This lander also deployed a mini rover, which photographed the lander itself. At least, China managed to land it upright, unlike some of the other countries!

Mars and Jupiter – Posted 14 January

Yesterday, despite extensive cirrus and cirrocumulus clouds, it was clear enough for me to observe Mars and Jupiter.

I saw a Shadow Transit by Ganymede upon Jupiter, crossing the planet, near the bottom of it. This appeared as a black dot. As Ganymede is the largest moon of Jupiter, it follows that it will cast the largest shadow and, thus, be the easiest one to see!

I could just see the dark feature of Syrtis Major on Mars. The Moon and Mars were just under 5 degrees apart, so they easily fitted into the same 10 X 50 binocular field of view.

Stars to go Supernova – Posted 14 January

As we saw in this month's talk by Tim Parsons from UCL, Betelgeuse is a good Supernova candidate. It is due to go supernova "soon", but that "soon" could be any time between tonight and about 100,000 years down the line!

In 2019-2020, it experienced a "Great Dimming" where it faded by from 0.5 to 1.7 magnitude. This was later shown to be due to a cloud of dust or soot ejected from this star, that resulted in the partially blocking the light from it, hence the dimming! This resulted in a lot of speculation on whether it was about to go supernova!

Another good candidate is Eta Carinae in the Southern Hemisphere, which did have an eruption in 1843.

It is still not known what the precursor signs are that will indicate when a star will go Supernova. In addition, there have been no visible supernovae in our galaxy since 1604! The only ones seen, have been in other galaxies.

Stars' lifetimes operate on a very slow timescale, as we see them, even the fast-evolving ones.

Tim also explained that some of these giant stars can actually now be resolved into disks by the latest telescopes, indeed, surface features such as giant star spots can actually be seen on some of them, such as Betelgeuse and Antares.

However, due to their vast distances from Earth, they still only have a tiny angular size of about 50 milliarcseconds! In most telescopes, though, stars usually only show up as dots, with essentially no angular size to them.

Like many of our speakers, Tim Parsons is from UCL, with others coming from its associated Mullard Space Science Laboratory

About 27 people attended this meeting, plus another 7 on Zoom, meaning that a total of 34 people viewed this meeting. EAS meetings have carried on being "hybrid" with both physical meetings and Zoom. This system has operated since the end of the Covid restrictions in July 2021some three and a half years ago. The Zoom aspect is useful for those who, for some reason, cannot physically get to a particular meeting. On this occasion, the icy, frozen conditions may

have put off some members from physically attending the meeting.

It is now 20 years, since our Society started meeting at Nonsuch High School for Girls. Prior to January 2005, meetings had been held at St Mary's Church Hall, in Ewell.

Mars and Jupiter Posted 21 January

There has been another spell of completely overcast skies, with no Sun visible at all for 3 consecutive days! Then, yesterday it finally appeared, although it was still not observable, as it was still shining via altostratus cloud cover!

However, in the evening, much to my amazement, the sky cleared entirely, so I had a look at Mars and Jupiter.

There was another shadow Transit of Ganymede crossing Jupiter in the late evening, near the bottom of it!

I also saw Syrtis Major centred on Mars. I think that the Northern Polar Cap had shrunk since my earlier observations. Mars was at 14.4' arcseconds in size, still nearly at its maximum size in this apparition!

Mars was still very bright with the naked eye, and very close to Pollux and Castor (only 3 degrees from Pollux). It appeared significantly brighter than Aldebaran and Betelgeuse!

Mars is at aphelic opposition, meaning that it passes Earth much more distantly than at its closest, or perihelic oppositions. Thus, it only gets up to just about 14.6' arcseconds, instead of 25' arcseconds. It does, however, reach a high altitude in the sky, unlike during perihelic oppositions.

Unlike Jupiter, Mars is a notoriously difficult planet to observe. Whereas Jupiter always has a good angular size, Mars never attains a really large angular size and, at its best, is only about half that of Jupiter. At this opposition, it is even less, at only about one third the size of Jupiter!

Earlier this evening, I saw the dark features of Mare Cimmerian and Mare Erythraeum, appearing in my telescope as a long curving linear feature, just like a smile, or a mouth at the bottom of a face.

As Mars is invariably quite small, even at opposition, I use the highest magnifications that are possible with my telescope. I find that the 222X and 300X magnifications are the best. I could just about pick out some of the dark features at 100X but, of course, it is much better at the higher powers.

I use a Wratten No. 23 Filter to enhance the visibility of surface markings.

Incidentally, Mars is about the only planet where you CAN see surface markings and features. This is because planets like Jupiter and Saturn are Gas Giants, so you are only seeing features in the top of their atmospheres, whilst in the case of Venus, which is permanently overcast with clouds (not unlike the UK!), once again, you can only see the tops of the clouds!

Mercury also displays surface features, but these are far more difficult to see - partly because Mercury always presents a small angular size (usually around 5 - 7' arcseconds), but also because the features are of lower contrast than they are on Mars. In addition, Mercury is only rarely well placed for observation in the sky.

When we observe Mars, we are only seeing large scale albedo features of dark and light areas. The dark areas represent areas swept clear of dust, while the orange areas have not been swept clear of dust.

Syrtis Major is the most prominent of the dark features, as well as Mare Acidalium, and Mares Cimmerian, Sirenum, Erythraeum , and Tyrrhenum.
Features such as craters, are very difficult to see and recognise, although imagers using the computer stacking method can achieve far clearer images. The great Valles Marineris canyon, and the shield volcanoes such as Olympus Mons can be seen, (or better, imaged) by amateur astronomers.

However, it is not surprising that before space probes reached Mars, it's true nature could not be seen; it’s always too distant from Earth, so the existence of craters came as a surprise!

The Great Planetary Alignment – Posted 23 January

Surprisingly, for no apparent reason, there have recently been several clear nights. This seems weird, as I had got used to the continually overcast skies! Of course, you can't hear clouds, or clear skies, so it often comes as a surprise when I look out to find that it has suddenly cleared up, (or more often, clouded over!).

There are 4 naked eye planets on view at the present, consisting of Venus and Saturn, low in the SW in the early evening, with Jupiter and Mars providing a magnificent site later.

These two planets are also reasonably close to each other. In addition to that, the faint planets of Uranus and Neptune are also present in the evening sky, making a total of 6 planets on view. No doubt, the Astrologers will be making a meal out of this event!

Today, I could see that Venus was now a very fat crescent 🌙, with the terminator no longer straight, but curving!

Mars is still significantly brighter than the orange stars of Aldebaran and Betelgeuse, and, in comparison to Mars, these two stars only appear as insignificant specks!

Object of the month – Jupiter, its clouds, & the Great Red Spot (GRS) - Martin Howe

There are three major features of Jupiter that are within easy reach of small telescopes. The first of these are Jupiter's Galilean moons [See Object of the Month in the December 2023 edition of Janus]. Then there are Jupiter's bands of clouds, and finally, within those cloud bands, there is the famous Great Red Spot (GRS).

One of the most distinctive features of Jupiter is its highly contrasting parallel bands of clouds, referred to as either "zones" or "belts". The lighter-coloured zones are high-pressure regions where clouds are composed of ammonia ice, while the darker belts are lower-pressure areas containing deeper clouds made up of compounds such as ammonium hydrosulphide.

The cloud bands are the result of Jupiter's powerful internal heat, complex dynamics of the atmosphere, and the planet's rapid rotation. As a result, the bands are constantly in motion, with winds reaching speeds of over 600 kilometres per hour in the planet's atmosphere. These winds generate massive storms and turbulent weather systems, the best known of which is the GRS, located on the edge of Jupiter's South Equatorial Belt.

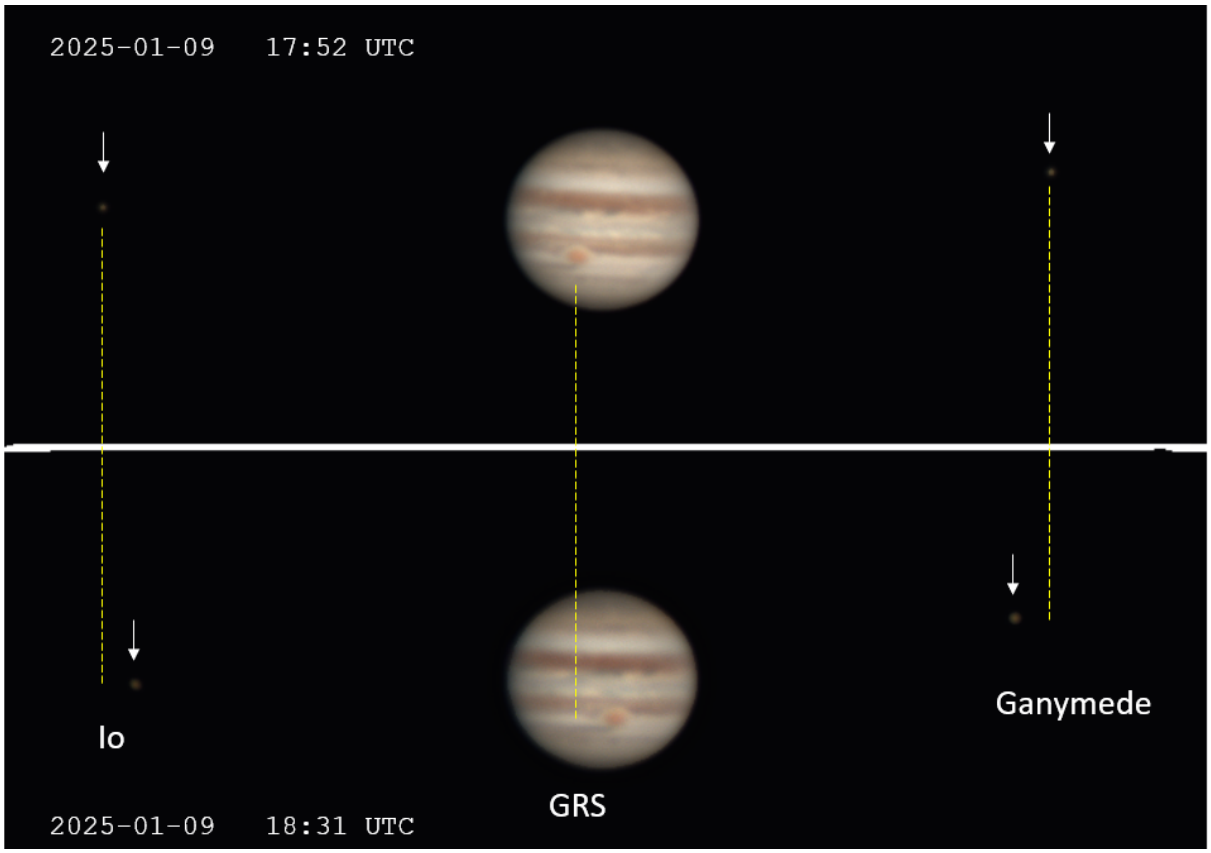
There is some uncertainty about how long this cyclonic storm has been raging. First reports of a spot date back nearly 400 years, with a potential observation attributed to Robert Hooke in 1664, or otherwise Giovanni Cassini in 1665. However, a recent study reported in the August 2024 Sky at Night website suggested that this may not be the spot we see today. This spot disappeared from view in 1713 and was not reported as having been seen again until 1831, leading to the speculation that our current spot is different to the one seen by Hooke and/or Cassini. It is also recognised that the current spot is slowly shrinking. Currently some 16,000 kilometres in width, compared to estimates from the 19th century more in the region of 40,000 kilometres.

The exact cause of the storm's contrasting reddish colour is not entirely certain, although theories suggest it may be due to chemicals in the atmosphere, such as ammonia, that interact with ultraviolet radiation from the Sun.

Jupiter rotates once every 10 hours, meaning that the GRS is frequently rotating into our field of view…and equally rapidly rotating out of view around to the far side of Jupiter! Central meridian transit times are readily available in astronomy magazines and websites – these indicate the time that the GRS passes across the middle of Jupiter (the meridian). As a result of Jupiter's rapid

rotation this means that we can only see, in theory, the GRS for about 2½ hours either side of this time, although in reality, the best views are really only little more than an hour each side of the transit time. The rapid rotation does mean though that it is very easy to see the progression of the GRS across the face of Jupiter within the space of an hour or so.

The two images below were taken about 40 minutes apart, showing how quickly Jupiter rotates. These were captured with an ASI664MC planetary camera attached to a 127mm refractor, with a 3x Barlow lens. In addition to the rotation of the GRS, you can hopefully also see in this image the orbital movement in two of the Galilean moons (arrowed) – Io on the left and Ganymede on the right,



What is the glitch on my image? – John Pillar

My telescope had faithfully captured images all night, I'd processed and stacked the images, and I was happy with the result - Markarian's Chain – a long line of galaxies comprising part of the Virgo Cluster. The collection of galaxies is named after an Armenian astrophysicist, Benjamin Markarian who, in the early 1960s, discovered that at least 7 of the galaxies were gravitationally linked and moving coherently. In fact, these galaxies form a small part of the Virgo Supercluster, which in turn is part of the absolutely mind-bogglingly large Laniakea Supercluster, more than 100000 galaxies on a cosmic filament – the structure of which derives from quantum fluctuations in space-time during the first microseconds after the Big Bang.

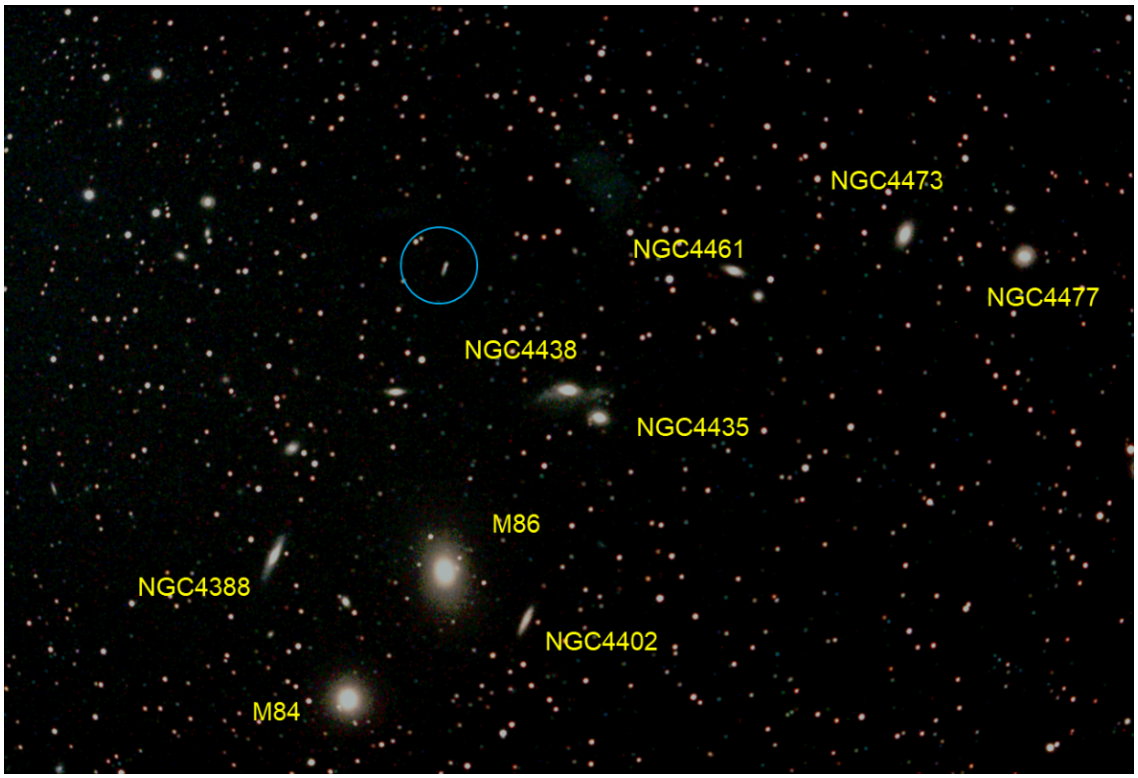


Figure 1: Markarian's Chain, in Virgo. RVO ED80mm refractor, 90x120sec on 23 April 2023. I've labelled the key objects (there are many more) and highlighted an unusual feature in blue.

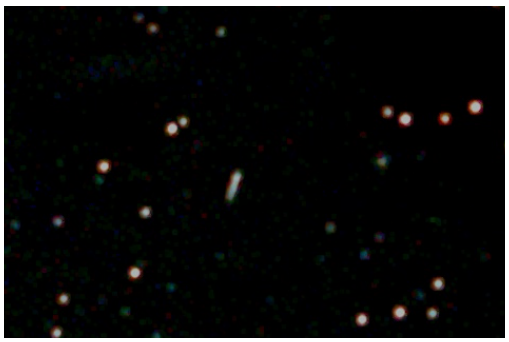


Figure 2: Zoom into the unexpected object

On taking a close look at the image (Figure 1), I noticed something strange – a streak of light, zoomed in on in Figure 2, and highlighted with a blue circle in Figure 1. Whereas the stars in the images had aligned and stacked well, there was something here that formed a line. Was it a glitch in my camera? Had I done something wrong in stacking my images? It wasn't long enough to be a satellite or aeroplane trail, so it was a bit of a puzzle.

So, I went back to the original, individual images that I'd taken. I had 90 images, each 2 minutes duration, captured over a 4-hour window between midnight and 03:30 on 23 April 23, 2023.

Interestingly, on the individual images there was no line of light, just a point, but looking carefully I could see that between the first and last images the point moved relative to other stars in the

image (Figure 3). So, that must be it - the linear feature on the stacked image was in fact the result of point of light that moved a tiny amount between every frame, and when I stacked all the images the points formed a line.

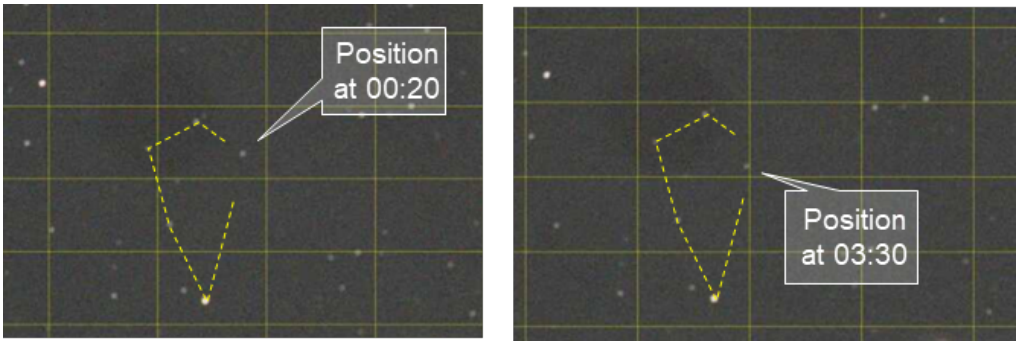


Figure 3: I've drawn a fixed frame (yellow dash line) with stars as the vertices, to demonstrate the movement of the object from 00:20 (left) to 03:20 (right). Ignore the equatorial frame – it's different in each image

But what was it?

Stellarium to the rescue. In Kstars, the application I used to control the telescope and capture the images, I could read off the RA and DEC coordinates of the object, and I knew the exact time each image had been captured. So, I changed the date-time in Stellarium and zoomed into the exact coordinate location of the object, and yes – there was an asteroid at the precise location, at that precise time. Amazing!!

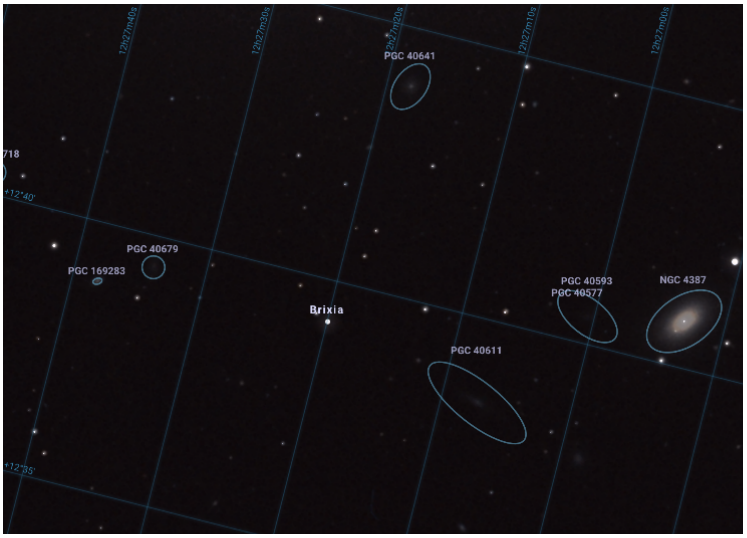


Figure 4: Screenshot from Stellarium at the time and RA-DEC of the object - finds Brixia exactly on location

The streak of light on my stacked image was caused by an asteroid, called Brixia, moving a small distance across the sky during the 3 hours I'd been taking my images.

521 Brixia is a minor planet discovered in 1904. It is a relatively large asteroid, 117 km in diameter and is a C-type asteroid, comprising lots of carbon plus rocks and minerals. Brixia orbits the sun every 4½ years between Mars and Jupiter, has an average magnitude of 8.6 and spins on its axis every 28 hours.

The mystery interloper was identified – moving sedately across about 4 arcseconds of sky over a period of 3 hours.

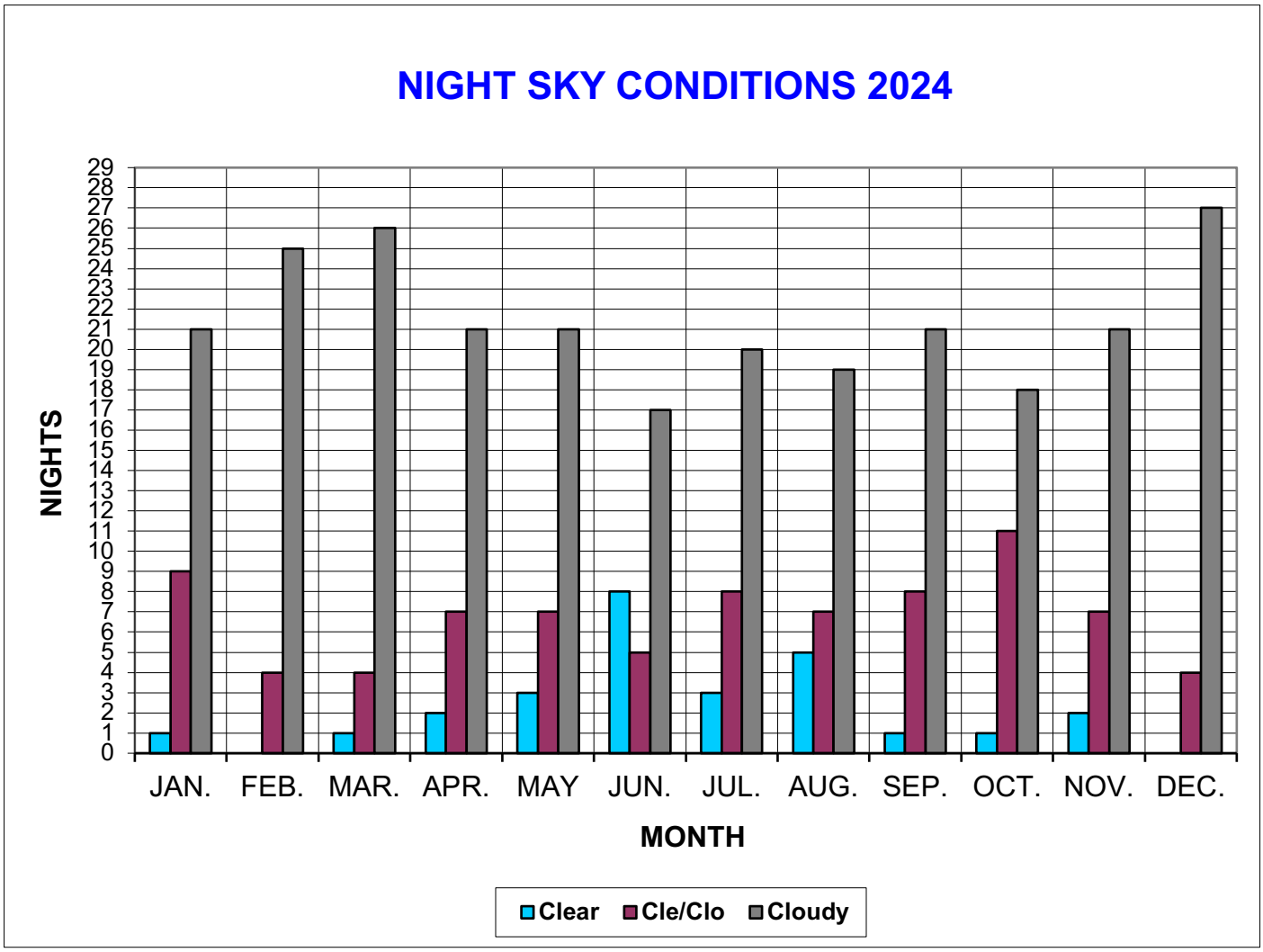
2024 Night Sky Conditions – Ron Johnson

The night sky conditions have been based upon the following criteria:

Clear:	*No cloud in the sky throughout the period. (Notionally dusk – 23.00UT)*
Clear / Cloudy:	*Cloud passing from time to time with clear periods long enough to permit observations to be made.*
Cloudy:	*Sky completely covered in cloud throughout the period.*

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Clear:	1	0	1	2	3	8	3	5	1	1	2	0
Clear/Cloudy:	8	4	4	7	8	5	8	7	8	11	7	4
Cloudy:	22	25	26	21	20	17	20	19	21	18	21	27

Totals: **Clear 27** **Clear/Cloudy 81** **Cloudy 257**



Longest run of consecutive clear nights: 5 nights 24 - 28 June

Longest period between clear nights: 48 nights 18 January - 6 March

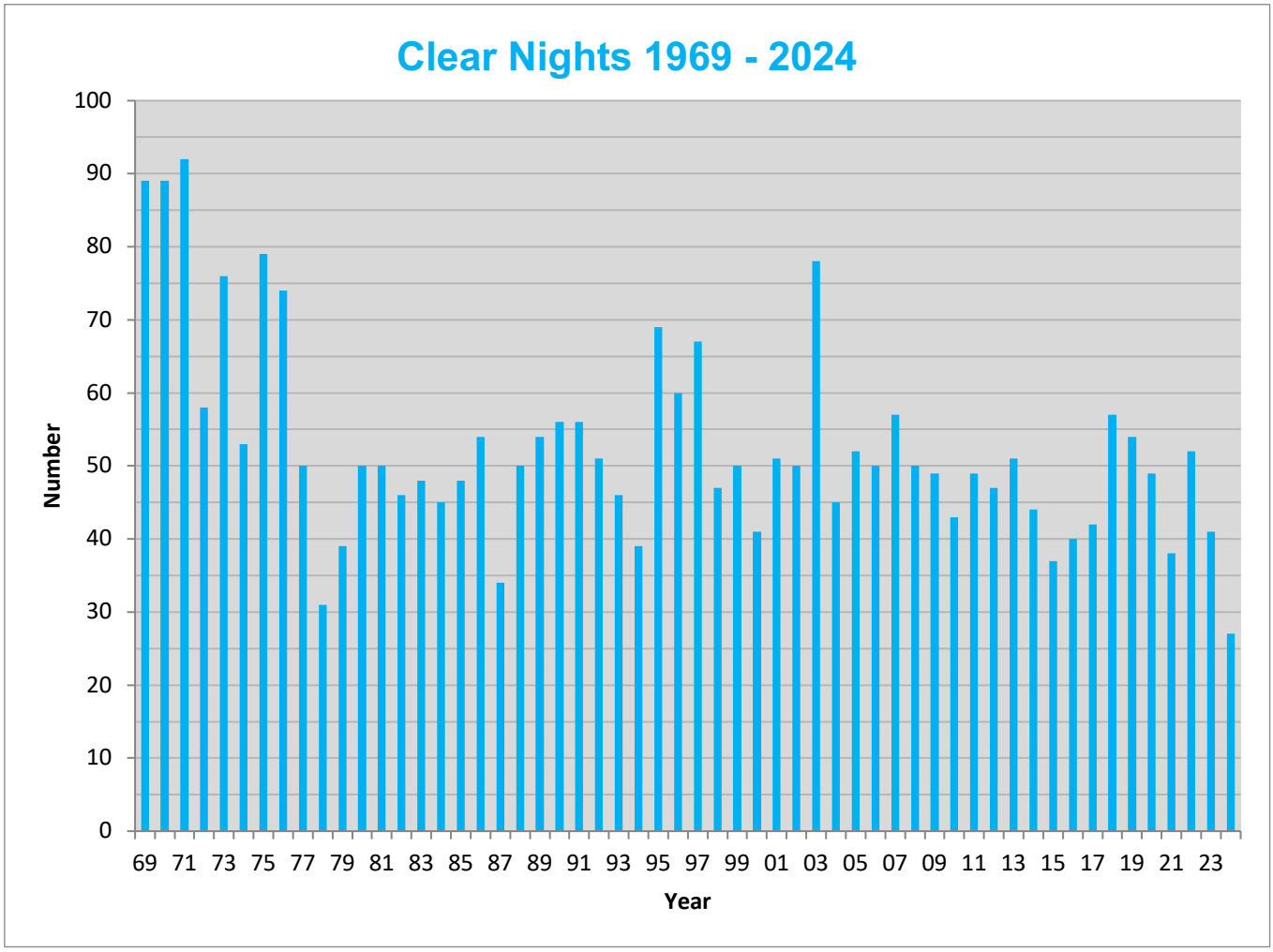
Longest run of consecutive cloudy nights: 15 nights 7 - 21 March
27 October - 10 November

Best Month: June (8 clear + 5 clear/cloudy)

Worst Months: February (0 clear + 4 clear cloudy), December (0 clear + 4 clear/cloudy)

Comparison of 2024 with previous years – since 1969

Clear Nights:	27	Least number of clear nights since 1969 1978 (31); 1987 (34); 2015 (37)
Clear/Cloudy	81	4 years with less clear / cloudy nights 1987 (56); 1991 (68); 1997 (67); & 1998 (67).
Cloudy Nights	257	1 year with more cloudy nights 1987 (275).
Useable Nights	108	1 year with less useable nights 1987 (90).



We've found an answer to the puzzle of how the largest galaxies formed

Acknowledgement: This article was written by Annagrazia Puglisi, Anniversary Fellow of Astrophysics, University of Southampton, and was first published in. THE CONVERSATION on 11 December 2024. It is republished in full under a Creative Commons Licence. The original article, with additional links and images can be found here: *https://theconversation.com/weve-found-an-answer-to-the-puzzle-of-how-the-largest-galaxies-formed-245413*

It is as humbling as it is motivating to think about how much we still have to learn about the universe. My collaborators and I have just tackled one of astrophysics' enduring mysteries: how massive elliptical galaxies can form.

Now, for the first time, we have solid observational evidence that provides an answer. Our results have recently been published in Nature.

Galaxies in the present-day universe fall into two broad categories. There are spiral galaxies, like our Milky Way, which are rich in gas and continuously form stars in a rotating disc. There are also elliptical galaxies, which are large and spherical rather than flat, similar to a rugby ball. The latter don't produce new stars but are dominated by stars formed more than 10 billion years ago.

The formation of elliptical galaxies has long been difficult to explain with cosmological models describing the evolution of the universe from the Big Bang to now. One of the challenges is that star formation during the era when elliptical galaxies formed (10 billion to 12 billion years ago) was thought to occur within large rotating discs, similar to our own Milky Way.

So how did the galaxies transform their shape from flat discs to three-dimensional elliptical galaxies?

Observations with Alma

By analysing data from the Atacama Large Millimetre/submillimetre Array (Alma), we identified the birth sites of giant elliptical galaxies. We discovered that local elliptical galaxies can form through intense and short-lived star formation episodes early in the universe, as opposed to starting out as a rotating disc and becoming more elliptical over time.

Our study examined the distribution of dust in more than 100 distant galaxies, which we know were forming lots of stars back when the universe was between 2.2 billion and 5.9 billion years old. Dust indicates the presence of gas - the material from which new stars are formed — and enables us to study the regions within a galaxy that are actively forming new stars.

Using a novel observational technique, we found that the dust in these distant galaxies is extremely compact and isn't what we expected from flat disc-shaped galaxies. Furthermore, we were able to infer the three-dimensional geometry of the dust-emitting regions. This analysis indicates that most of the early star-forming galaxies were actually spherical rather than disc-shaped. In fact, they closely resemble the shape of elliptical galaxies near us today.

We then used cosmological computer simulations to interpret the observational results and understand the physical mechanisms that may have caused dust and gas to sink into the centres of these distant, star-forming galaxies.

Our analysis reveals that the simultaneous action of cold gas streams from surrounding galaxies along with galaxy interactions and mergers can drive gas and dust into compact, star-forming

cores within these galaxies. The simulations also show us that this process was common in the early universe, providing a key explanation for the rapid formation of elliptical galaxies.
Our findings add a crucial piece to this puzzle, advancing our understanding of galaxy formation and evolution.

A novel observational technique

This discovery was made possible by a novel technique for analysing ALMA observations. Alma data are different than the images we are used to see from optical telescopes. In fact, Alma operates by combining signals from multiple antennas that work together as a single, giant telescope.

This technique is known as interferometry, and while it allows to obtain sharp images of distant galaxies, the data analysis is more complex than for traditional optical images. Our new technique enables more precise measurements of dust distribution compared to previous methods, offering a significant advancement in this field.

For this research we used archival, open-access Alma data accumulated over several years. This highlights the power of open-source data, where scientists share their findings, and worldwide collaborations in driving scientific breakthroughs.

Future observations with JWST and Euclid space telescopes will further map the distribution of stars in the distant ancestors of today's elliptical galaxies. And the Extremely Large Telescope, with its 39-metre-wide mirror, will provide unprecedented detail of the star-forming cores in distant galaxies.

Additionally, sharper observations of gas dynamics with ALma and the Very Large Telescope will reveal how gas moves towards galaxy centres, fuelling star formation and shaping the galaxies we see today.

Up Next:

NEXT MEETING: 8pm Friday 14 February – Nonsuch High School

Neil Phillipson will give a talk about the New Space Race and the Solar System.

There 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 sessions, allowing for moon rise & set times and cloud conditions, should be sometime around the new moon which is on 28 February.

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 26 February to 3 March.

AD HOC OBSERVING AT WARREN FARM:

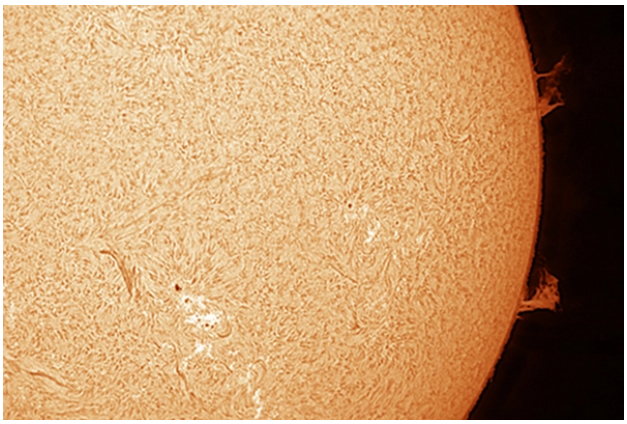
These will be at short notice when the weather is favourable, and may replace, or be additional to, sessions at Denbies. Please watch our WhatsApp feed for alerts.

Equipment for Sale:

Contact: Martin Howe – howem@hotmail.co.uk or via EAS WhatsApp

1. Lunt35 Hydrogen Alpha Solar Telescope (Deluxe) – with original box, plus solar finder and tube rings. £400

Dedicated hydrogen alpha (Ha) filtered telescopes allow a safe and easy way to directly observe and image the Sun. It can reveal the detailed granulations on the surface, and prominences on the limbs – see the image below taken by me with this telescope. The deluxe version has a larger B600 blocking filter than the standard version giving a better field of view of the Sun. I'm selling as I have upgraded to a larger version. This comes with a helical focuser (rather than rack & pinion). Lunt no longer make this model (the entry level is now the Lunt 40, and the Lunt 40 B600 model retails for about £1,400. Coronado also sell the Coronado 40mm PST which retails for £700 - 800).



2. Revelation 203mm Ritchey-Chretien reflecting telescope (with padded soft-sided carry bag on wheels). £200

Used no more than a couple of dozen times. Excellent condition, just a few marks on the dovetail bar. Selling as I now prefer smaller more portable kit for wide-field astrophotography. Note that the tube weighs 7.3 kg so will need a solid mount to attach it to.

This scope is no longer in production, but the model (with specifications) is shown in this link:

https://www.astroshop.eu/telescopes/revelation-ritchey-chretien-rc-203-1624-ota/p,52012

3. Televue 0.8x Focal Reducer / Flattener (Boxed) £175

Focal reducer by Televue. Selling as I have three focal reducers but only need one! See the link below for details of the specifications.

https://www.widescreen-centre.co.uk/televue-08x-reducerflattener.html