June 2024 EDITION
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Editorial

Welcome to the June edition of Janus which comes after a busy (and exciting) month for the Society.

As reported later in this issue, we started with a presence at the Nonsuch Country Show. We then had an excellent lecture from Ivana Preanic, which will be a hard act to follow for this month's speaker Dr Lilian Hobbs - let's hope hers is equally stimulating.

As it turned out, last month's lecture on imaging couldn't have been more appropriate, being the ideal precursor to what must surely be seen as the most unique imaging opportunity that many members will ever have witnessed. I am, of course, referring to the spectacular (and rare) views of the Aurora Borealis on the night of 10/11 May, which were visible across large areas of the UK – possibly more so than ever before. It will therefore come as no surprise that this month's issue has a significant amount of content related to this event.

The geo-magnetic storm that gave rise to the Aurora and associated phenomena has been christened the Gannon Superstorm of 2024 in honour of the space weather physicist Jenn Gannon who, ironically, died a week or so earlier. One of the largest ever geomagnetic storms, it was caused by a massive X-class flare from an active sunspot region AR3664, over 15 Earths wide. For perspective, sunspots are usually about the same size as Earth (i.e. 1 Earth wide!).

AR3664 continues to be very active, bringing with it the possibility of further Aurorae! (*https://www.skyatnightmagazine.com/news/solar-flare-ar-3697-geomagnetic-storm* for more information)

John

The Solar System June

MERCURY: begins the month soon passing behind the Sun and is difficult to see reaching its highest point in the sky during daytime and being on the horizon at dawn. By the end of the month, having recently passed behind the Sun at superior solar conjunction, it remains difficult to see, reaching its highest point in the sky during daytime and being no higher than 3° above the horizon at dusk.

VENUS: begins the month soon passing behind the Sun and is not observable since it is very close to the Sun, at a separation of only 1° from it. By the end of the month, having now passed behind the Sun at superior solar conjunction, it remains not readily observable since it is very close to the Sun, at a separation of only 6° from it.

MARS: 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 5° above the horizon at dawn. By the end of the month, it is visible in the dawn sky, rising at 01:51 BST – 2 hours and 54 minutes before the Sun – and reaching an altitude of 15° above the E horizon before fading from view as dawn breaks at around 03:37.

JUPITER: recently passed behind the Sun at solar conjunction. It begins the month difficult to see reaching its highest point in the sky during daytime and being 1° below the horizon at dawn. By the end of the month, however, it is visible in the dawn sky, rising at 02:50 BST – 1 hour and 55 minutes before the Sun – and reaching an altitude of 11° above the E horizon before fading from view as dawn breaks at around 04:17.

SATURN: is currently emerging from behind the Sun. It begins the month visible in the dawn sky, rising at 02:08 BST – 2 hours and 39 minutes before the Sun – and reaching an altitude of 13° above the SE horizon before fading from view as dawn breaks at around 03:43. Visibility improves as the month progresses until, by the end of the month it is

visible in the dawn sky, rising at 00:15 BST and reaching an altitude of 26° above the SE horizon, before fading from view as dawn breaks at around 03:41.

URANUS: recently passed behind the Sun at solar conjunction. It begins the month extremely difficult to see, being close to the Sun, at a separation of only 16° from it. By the end of the month, it remains difficult to see, reaching its highest point in the sky during daytime and being no higher than 1° above the horizon at dawn.

NEPTUNE: is currently emerging from behind the Sun. It begins the month very difficult to see, reaching its highest point in the sky during daytime and being no higher than 2° above the horizon at dawn. By the end of the month, it remains difficult to see, reaching its highest point in the sky during daytime and being no higher than 17° above the horizon at dawn.

MOON PHASES:

Last Quarter	30 May
New Moon	6 June
First Quarter	14 June
Full Moon	22 June
Last Quarter	28 June

Notable Events:

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

June

1 Close approach of the Moon and Neptune
Lunar occultation of Neptune
The Great Globular Cluster in Hercules is well placed

2 The Moon at perigee
Close approach of the Moon and Mars

3 Asteroid 43 Ariadne at opposition
Messier 12 is well placed

4 Close approach of Jupiter and Mercury
Venus at superior solar conjunction

5 The Moon at perihelion
Conjunction of the Moon and Jupiter
Messier 10 is well placed

6 Messier 62 is well placed

10 Daytime Arietid meteor shower 2024
Messier 92 is well placed

11 Comet 154P/Brewington passes perihelion

13 Mercury at perihelion

14 The Moon at apogee
Mercury at superior solar conjunction

15 NGC 6388 is well placed

16 Lunar occultation of Spica
The Butterfly cluster is well placed
NGC 6397 is well placed

18 The cluster IC 4665 is well placed

20 Lunar occultation of Antares
June solstice
The Ptolemy cluster is well placed

22 The Moon at aphelion
The Lagoon Nebula is well placed

23 NGC 6541 is well placed

27 June Bootid meteor shower 2024
The Moon at perigee
Close approach of the Moon and Saturn
Lunar occultation of Saturn

28 Asteroid 42 Isis at opposition
Close approach of the Moon and Neptune
Lunar occultation of Neptune
The cluster NGC 6633 is well placed

29 Saturn enters retrograde motion

30 Comet 13P/Olbers passes perihelion
Messier 22 is well placed

July

1 Comet 13P/Olbers reaches peak brightness
Close approach of the Moon and Mars
The cluster IC 4756 is well placed

2 Neptune enters retrograde motion
Close approach of the Moon and M45

3 Conjunction of the Moon and Jupiter

5 The Earth at aphelion

6 The Moon at perihelion
1 Ceres at opposition

7 Conjunction of the Moon and Mercury

9 The Great Peacock Globular Cluster is well placed
Mercury at highest altitude in evening sky

10 Venus at perihelion

12 The Moon at apogee

14 Lunar occultation of Spica

15 Close approach of Mars and Uranus

17 Lunar occultation of Antares
Messier 55 is well placed

18 Mercury at dichotomy

20 The Moon at aphelion

22 Mercury at greatest elongation east

23 134340 Pluto at opposition

24 The Moon at perigee
Close approach of the Moon and Saturn
Lunar occultation of Saturn

25 Close approach of the Moon and Neptune
Lunar occultation of Neptune

27 Mercury at aphelion

28 Piscis Austrinid meteor shower 2024

29 Close approach of the Moon and M45

30 Southern δ-Aquariid meteor shower 2024
α-Capricornid meteor shower 2024
Close approach of the Moon and Mars
Close approach of the Moon and Jupiter

31 Lunar occultation of Beta Tauri

Collected Observations (and thoughts) – Gary Walker

Huge Sunspot – Posted 9 May

Today, and a few days earlier, there has been a huge sunspot upon the Sun. Through my telescope, it appears as a huge area of spots, multiple umbrae, and penumbra! It was large enough to be seen as a spot, with my naked eye (with an appropriate filter of course!) and was also easily seen in my 10x50 binoculars.

According to the Space Weather News website, it is equally as large as the one that caused the Carrington Event in 1859! Let's hope that this spot doesn't emit an equally large solar storm as back then, as you can only imagine the effect this would have on today's electronically dominated world!

It has been stated that this Sunspot is about 200,000 km in length. In other words, it takes up a sizable portion of the Sun; 200,000km is 125,000 miles! When observing the Sun, it is easy to forget the sheer SCALE of features visible upon its surface as the Sun itself is 864,000 miles in diameter - and we are viewing it from 93 million miles away!

Aurora – Posted 11 May

With the Sun being very active lately, with the Big Spot and flares, it is not very surprising that some Aurora is visible even at lower latitudes. I couldn't see any colours with the naked eye, but with my camera, using exposures of about 1-2 seconds, I could see beautiful pink/red colours in the West, in glows, and long streaks!

This is the first time that I have ever experienced the Aurora, or "Northern Lights"!

I was first alerted to their presence by Anita King's post photographs, and there was also another post, with photos from Woodmansterne, on Facebook!

The Aurora has blown up all over social media today, not just on astronomical sites, but on general Facebook and Next Door local sites, too!

Most say that they are better through a camera. This is because they are still faint and, just like Deep Sky Objects, our eyes are useless at picking up faint colours at night! However, a camera can pick them up, if you use a longer exposure!

Media Reporting on the Aurora – Posted 13 & 16 May

The media's love affair with the Aurora has still not abated, as even today (some 3 days later) they still had a report in the London BBC News!

Unfortunately, despite a clear sky, there was no repeat performance on Saturday night!

Even as late as 16 May, there was yet ANOTHER report on the Aurora, on the BBC News!

Professor Ian Morrison – Posted 22 May

Most Society members will now be aware of the death of our Patron, Professor Ian Morison on 13 April this year, aged 80.

I noticed in the June issue of Astronomy Now magazine, he was given equal billing with Professor Peter Higgs, who predicted the existence of the Higgs Bosin Particle, who has also died recently.

Ian Morison became our Patron after the death of Sir Patrick Moore, who died in December 2012. Now, the Society is searching for a new Patron.

Professor Ian Morison occasionally gave talks to our Society. Indeed, he gave the talk at the Society's 50th Anniversary Dinner at

Horton Park Golf Club on 12 November 2016. He last physically attended the EAS to lecture in July 2019, his last two lectures being held on Zoom. One was in March 2021 whilst the Covid restrictions were still in place, and his last ever talk to us was on 9 June 2023, also on Zoom.

He had his main career at Jodrell Bank Observatory, where he was developing MERLIN, (the Multi-Element Radio Linked Interferometer Network) of radio telescopes across England.

He also wrote numerous books and guides to Astronomy and Astrophotography.

He co-founded the Macclesfield Astronomical Society, and was the 35th Gresham Professor of Astronomy, as well as once being President of the Society for Popular Astronomy. He also taught at the University of Manchester, as well as writing articles for the Astronomy Now magazine on Astrophotography. As if all that was not enough, he also gave talks to astronomical societies other than ours! He will be greatly missed by many people.

Solar storms that caused pretty auroras can create havoc with technology — here's how

Acknowledgement: This article was written by Jim Wild, Professor of Space Physics, Lancaster University and was first published in THE CONVERSATION on 14th May 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/solar-storms-that-caused-pretty-auroras-can-create-havoc-with-technology-heres-how-230020*

At the weekend, millions of people around the world were treated to a mesmerising display of the aurora borealis and aurora australis, better known as the northern and southern lights. The lights, usually seen in crown-like regions surrounding the Earth's poles, were pushed to mid-latitudes by heightened activity from the Sun.

The same geomagnetic storms causing the auroras can cause havoc with our planet's human-made infrastructure. These storms, caused by high energy particles from the Sun hitting our atmosphere, have the potential to knock out electrical grids and satellites. So what were the impacts of this recent burst of stormy space weather?

Around May 8, an active region of the Sun exploded, flinging a billion-tonne cloud of magnetised and electrically charged material known as a coronal mass ejection (CME) towards the Earth. This turned out to be the first of several successive CMEs, which later merged to form a single, massive structure.

This crashed into our planet's magnetosphere, the region of space near Earth that is dominated by the terrestrial magnetic field. As sub-atomic particles from the CME are funnelled downward, channels of electrical current flowing through part of the atmosphere known as the ionosphere, are intensified.

Apart from triggering the auroral displays, this can cause powerful magnetic fluctuations at the Earth's surface. As a result, electrical currents can flow through power grids, pipelines and railway lines, potentially interfering with normal operations.

The sub-atomic particles from the CME can cause damage to the solar panels and electronics of satellites. On Saturday, Elon Musk said that his company SpaceX's Starlink internet satellites were "under a lot of pressure," because of the storm, "but holding up so far".

The disturbances in the ionosphere were compounded by a series of bright eruptions called “flares” on the Sun that poured high energy radiation across the Earth’s sunlit face. Flare activity is associated with radio blackouts that can interfere with high-frequency radio communications, such as those required by aircraft on trans-oceanic flights. There are indications that the storm caused some disruption on transatlantic flights, but these reports are still being assessed.

Shawn Dahl, service coordinator for the Space Weather Prediction Center at the National Oceanic and Atmospheric Administration (NOAA) in Colorado told US National Public Radio that power grid operators had been busy “working to keep proper, regulated current flowing without disruption”.

He also added that some GPS systems had struggled to lock locations and had offered incorrect positions. These GPS problems appear to have caused disruption to navigational systems in farming equipment in the US. Many tractors use GPS to plant precise rows in a field, avoid gaps and overlaps. The problems happened during the height of planting season in the midwest and Canada.

Some of this may sound a bit like a Hollywood disaster movie. Yet, while the GPS problems caused significant disruption in agriculture, impacts do not appear to have been widespread across the Earth. For many or most, life seems to have carried on, regardless. How come?

Awareness and preparedness certainly helped. What we just experienced was, without question, an unusually strong space weather event. It’s early days and scientists will be analysing the storm of May 2024 for years to come. However, early indications are that last weekend’s geomagnetic storm was the most powerful since the “Halloween storm” of October 2003. Beyond the beautiful lights in the sky, the negative impacts of the 2024 storm aren’t yet completely clear.

At this stage, it doesn’t look like there were any catastrophic failures, but infrastructure operators will be taking stock to understand if, and how, their systems were affected. Behind the scenes, national agencies such as NOAA and the Met Office in the UK were monitoring the activity, issuing forecasts and alerts to interested parties, and liaising with experts and governments. In response, infrastructure operators took steps to ensure the continuity of services and safeguard their equipment.

Even bigger storms

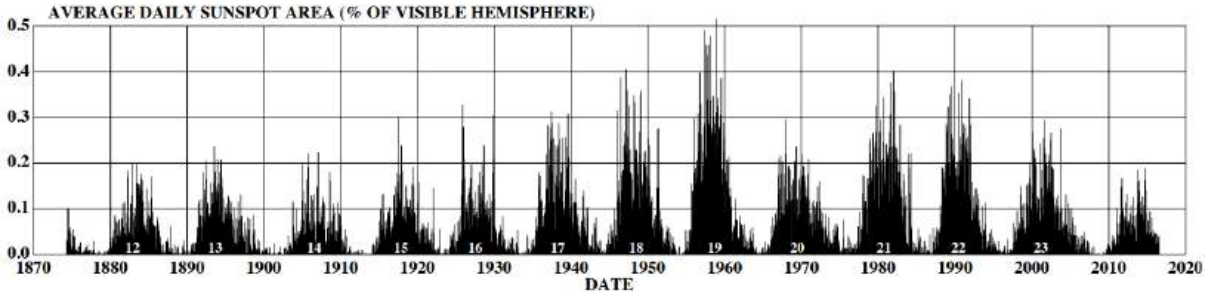
However, what we’ve just experienced wasn’t the biggest such event ever seen. That honour goes to the “Carrington Event” of September 1859, in which a massive CME (or most likely a pair of CMEs) triggered a huge geomagnetic storm that pushed the aurora borealis as far south as the Caribbean and induced such powerful currents in copper telegraph lines that at least one operator suffered a severe electric shock – though he lived.

By some metrics, the Carrington event was two to three times more powerful than the storm we have just witnessed. Such massive events are rare, probably occurring once every couple of hundred years, in contrast to the May 2024 storm which was of a scale seen once every couple of decades.

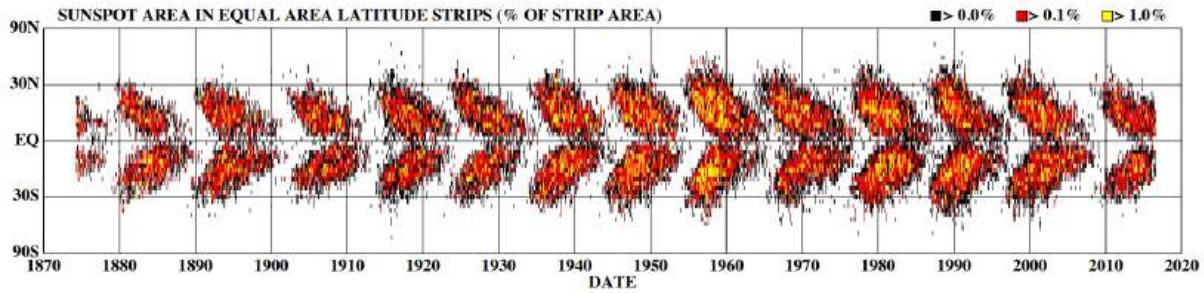
Human technology is able to cope with relatively powerful space weather events, but modern technologies and infrastructure have never experienced anything like the Carrington event. This is why researchers strive to better understand space weather and work with agencies and government to predict and mitigate its impact on our society and develop better forecasting tools.

Object of the Month – Sunspots and Aurora – Martin Howe

Sunspots were first observed in the early 17th century soon after the telescope was used to observe the night sky, and by about the mid-19th century daily observations were being recorded. This allowed astronomers to identify that sunspot activity follows a very regular rhythm, with activity peaking on an 11-year cycle. This can be seen very clearly on a histogram plot as shown below (solarscience.msfc.nasa.gov).

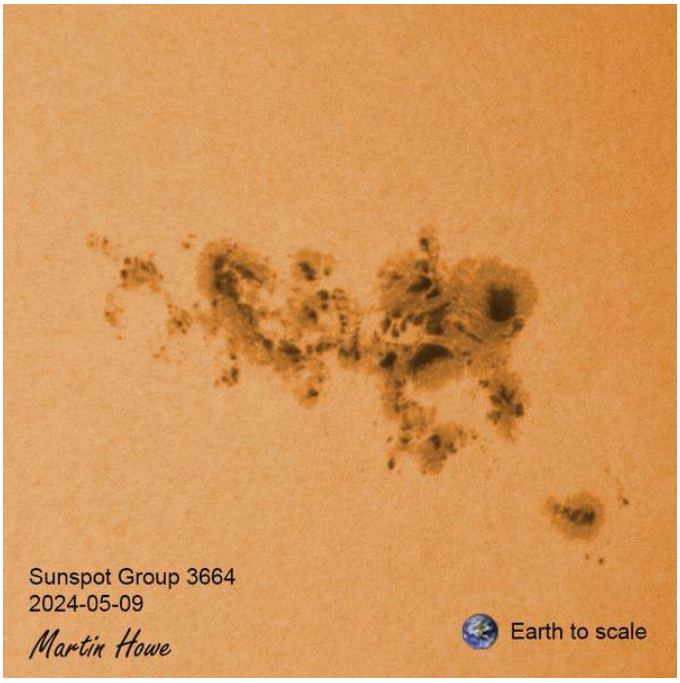


Furthermore, these sunspots show a distinct pattern to their appearance in terms of latitude on the solar disk, tending to first appear following a period of minimum activity further from the equator, and from there, migrate towards the equator as the activity approaches the next minimum. This can be represented in what has become known as a butterfly diagram, for obvious reasons, as shown below (solarscience.msfc.nasa.gov).



Why sunspots migrate towards the equator is not well known, but a number of theories exist. One such theory is based on the fact that the sun, being a ball of gas, rotates at different speeds at each latitude, with the equatorial regions rotating every 25 days, whilst in the polar regions it is about 35 days. It is this differential rotation that could be the cause of the inwards migration to lower latitudes.

The sunspots themselves are cooler areas on the Sun's visible surface (photosphere). The sun's surface is about 5,700° K, with the sunspots 'only' about 3,700° K. This relative coolness results in these regions appearing as dark spots against the hotter photosphere. The generally accepted theory as to their origin lies with the twisting of the magnetic fields, again as a result of the differential rotation of the Sun at different latitudes.
These sunspots, although sometimes looking small on the surface of the Sun, can be very large. The image below shows sunspot group AR3664 which was thought to be the origin of the auroral storm that resulted in the northern lights being visible from London in early May. Note the approximate scale image of the Earth!



This image was taken with a 127mm refractor with a homemade white light filter. It is important to stress that you should only look at the Sun with suitable protection, and if in doubt, speak to one of the experienced solar observers in the society.

White light filters are cheap and easy to construct, but you have to be very careful not to scratch the delicate solar film, as even the slightest scratch could let through suffieicnt unprotected rays that could do irreprable damage to your eyes. This film is readily obtainable at reputable online astronomy dealers, and costs in the region of £20 for an A4 sheet. I use old plastic plant pots, chop the bottom off, and the tapered end makes a perfect fit for the end of a small refractor, creating a light-tight snug fit that has very little risk of accidentally dislodging. Shown below is one such home made white light filter for my 102mm refractor.

As mentioned, the increased solar activity also leads to increased auroral activity here on Earth. In periods of high solar activity, the Earth is bombarded by more energetic charged particles emitted from the Sun. These get caught up in the Earth's magnetic fields and channelled down towards the magnetic poles. As they slam into the atoms in the atmosphere, they excite these atoms, causing them to glow. The main constituent atoms of our atmosphere are nitrogen and oxygen. Excited oxygen atoms glow green, and nitrogen will glow pink. Other colours such as red and purple can also appear depending on the height within the atmosphere that the excitation occurs.

A good reference website to visit is "spaceweather.com" which provides auroral forecasts (bearing in mind aurorae are fickle and are hard to predict accurately!) and current sunspot activity.

I don't think anyone could have escaped the deluge of auroral images in the news and on social media (along with many fake images displaying very garish colours) in early May following the large auroral storm that hit the Earth's atmosphere, resulting in the very uncommon appearance of a bright aurora visible even from light polluted central London! I also saw several posts on social media trying to illustrate the differences one sees between these stunning images and what one sees with the naked eye. There is an analogy here with nebulae images – these look stunning, but an observer's first view of, say, the Orion nebula through a telescope eyepiece is often underwhelming. This is due to the insensitivity of the human eye to registering colour at low intensities such as with nebulae, but also the fact that cameras can take long exposures, which the eye cannot. I thought these posts illustrating these differences were very informative, so I thought I

would replicate them here, using one of my images of the aurora taken from my garden in inner London.

The image on the left is what you might see with your naked eye – something that you could easily mistake as a bit of high cloud, although you might just be able to see some faint colour. The middle image is what the camera took (a 6-second exposure, unprocessed). The right-hand image shows the same image after enhancing the colour in photoshop. One quick way to determine whether it is an aurora or a cloud (if the forecast indicates the potential for an aurora) is to take a photo with your phone – most phone cameras now have a long exposure or night mode, and this will quickly reveal the colour if it is an aurora.

You will be able to see a number of images of the aurora taken by society members elsewhere in this issue.

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 14 June – Nonsuch High School

Dr Lilian Hobbs will deliver the Maurice Gavin Memorial Lecture entitled "Left in Space".

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 session, allowing for moon rise & set times and cloud conditions, should be sometime around the new moon which is on 6 June.

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 3-14 June.

AD HOC OBSERVING AT WARREN FARM:

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

Members' Aurora Images

The following 3 pages feature a limited selection of the images of the Aurora taken by EAS members. They have been taken from the EAS WhatsApp feed and are annotated with the member's name (as it appears on the feed) and, where known, the location of the image. Some have been enhanced to improve their quality. Not all images were suitable for publication, and some were duplicated – hence the relatively small number selected.


Adrian Bourne - Sutton

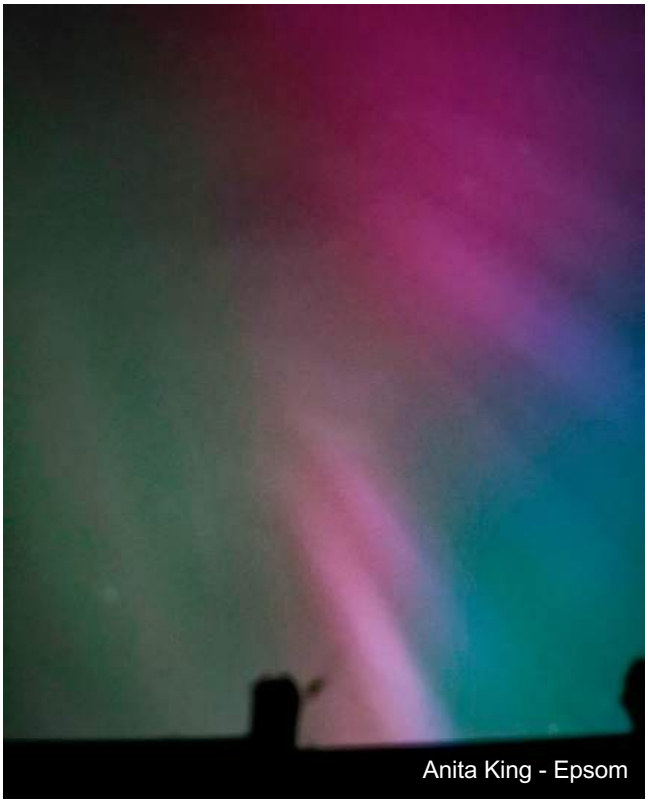

Suzanne Fox – Motspur Park


Matt Graydon


Casper – View over London


Chris Kibbey – Usk Reservoir


Astronomy


Anita King - Epsom


Sam


Aurora Borealis
2024-05-10
Southfields, London
Martin Howe


Peter Scott


Anonymous

Nonsuch Town and Country Show – 5-6 May – John Davey

As in previous years, EAS took a stand at this year's annual Nonsuch Town and Country Show. The show, run by Quintessentially British Events, is held in Nonsuch Park, and attracts a large number of visitors many of whom purchase their tickets in advance.

The aim of our presence is to publicise the society and its events, raise public awareness of astronomy and, hopefully, attract new members.

The weather this year was mixed. Sunday 5 May was largely sunny, and visitors to the stand were able to view the sun (with sunspots!) through two telescopes, fitted with appropriate filters, manned by Pete and Steve. Monday 6 May was not so good – it rained most of the day before (inevitably) clearing up just in time for the early finish and packing up. Nevertheless, there was a steady trickle of hardy visitors to the stand.

Stand set up and ready to go

Aligning the telescopes fitted with solar filters to look at the Sun

Anita, John, Martin, Pete and Steve waiting for the show to open on Sunday

Pete trying to look enthusiastic on a wet Monday