JANUS

THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

January 2021 EDITION

Editor: ewellastro.editor@gmail.com
Email: ewellastro@gmail.com
Website: https://www.ewellastronomy.org

Editorial

Welcome to the first edition of Janus for 2021. I trust you all had a reasonably enjoyable Christmas - even if it wasn't quite as you had planned it to be - and here's hoping for a better 2021. Could it be worse?!

Looking forward in 2021, it's obvious that Covid-19 restrictions will continue to preclude physical meetings and group observing sessions. They seem set to remain in place until at least Easter - more than a year after our last physical meeting - and my guess is that we will struggle to have a physical meeting before May or June.

As Stephen reports later, we had 2 virtual meetings in December - a re-run of the October "Astrophotographers" lecture, followed by our AGM - and January's meeting will also be a virtual one. Given the impossibility of holding physical meetings, it's as well that we have mastered this new form of meeting. Although, maybe, not everyone's cup of tea, they do provide a way of keeping in touch, and provided sound and vision work, people can see and speak to each other - preferably not all at the same time!

This month, Gary Walker has again provided some notes on his observations, and Stephen has contributed 4 further pieces.

At the risk of becoming boring, I will re-iterate my plea for members to send me any contributions they feel able to make. I rely on these to keep Janus going - no contributions = no Janus - so please keep them coming! Members can also share their observing experiences on social media.

John

SkyUpdate

What's up this month?

The Solar System January

MERCURY: recently passed behind the Sun at superior solar conjunction. It begins the month not readily observable since it is very close to the Sun, at a separation of only 7° from it. By the end of the month, having recently passed greatest elongation E it is still not observable as it will reach its highest point in the sky during daytime and is no higher than 6° above the horizon at dusk.

VENUS: is not observable this month. At the beginning of the month, it will reach its highest point in the sky during daytime and is no higher than 6° above the horizon at dawn. will soon pass behind the Sun. By the end of the month, it will reach its highest point in the sky during daytime and is 0° below the horizon at dawn.

MARS: recently passed opposition and begins the month visible in the evening sky, becoming accessible around 16:36UT as the dusk sky fades, 40° above the SE horizon. Reaching its highest point in the sky at 18:54, 49° above the S horizon, it will continue to be observable until around 00:53, when it sinks below 9° above the W horizon. By the end of the month, it becomes accessible around 17:27UT as the dusk sky fades, 54° above the S horizon. Reaching its highest point in the sky at 17:52, 55° above the S horizon, it will continue to be observable until around 00:09, when it sinks below 11° above the W horizon.

JUPITER: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it will become visible around 16:25UT as the dusk sky fades, 9° above the SW horizon. It will then sink towards the horizon, setting 1 hour and 53 minutes after the Sun at 17:51. By the end of the month, having recently passed behind the Sun at solar conjunction, it is not readily observable since it is very close to the Sun, at a separation of only 1° from it.

SATURN: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it is not observable, reaching its highest point in the sky during daytime and being no higher than 6° above the horizon at dusk. By the end of the month, having recently passed behind the Sun at solar conjunction, it is not readily observable since it is very close to the Sun, at a separation of only 6° from it.

URANUS: is an early evening object, receding into evening twilight. It begins the month visible in the evening sky accessible from around 17:29UT as the dusk sky fades, 44° above the SE horizon. It will then reach its highest point in the sky at 19:32, 51° above the S horizon, and will continue to be observable until around 00:24, when it sinks below 21° above the W horizon. By the end of the month, it will become visible around 18:08UTas the dusk sky fades, 51° above the S horizon. It will then sink towards the horizon, setting at 00:51.

NEPTUNE: begins the month as an early evening object, visible in the evening sky from around 17:29UT as the dusk sky fades, 31° above the S horizon. It will then sink towards the horizon, setting at 22:09. By the end of the month, it will soon pass behind the Sun at solar conjunction, and will not be observable, reaching its highest point in the sky during daytime and being no higher than 17° above the horizon at dusk.

MOON PHASES:

Full Moon	30 December
Last Quarter	6 January
New Moon	13 January
First Quarter	20 January
Full Moon	28 January

Notable Events:

January 7th and 22nd/23rd:

These are three ideal nights to observe two of the greatest craters on the Moon, Tycho and Copernicus, as the terminator is nearby. Tycho is towards the bottom of Moon in a densely cratered area called the Southern Lunar Highlands. It is a relatively young crater, about 108 million years old.

Copernicus is about 800 million years old and lies in the eastern Oceanus Procellarum beyond the end of the Apennine Mountains.

It is 93 km wide and nearly 4 km deep and is a classic "terraced" crater. Both can be seen with binoculars.

Tycho and Copernicus: Ian Morison

January 20th evening: Mars lies above a first quarter Moon

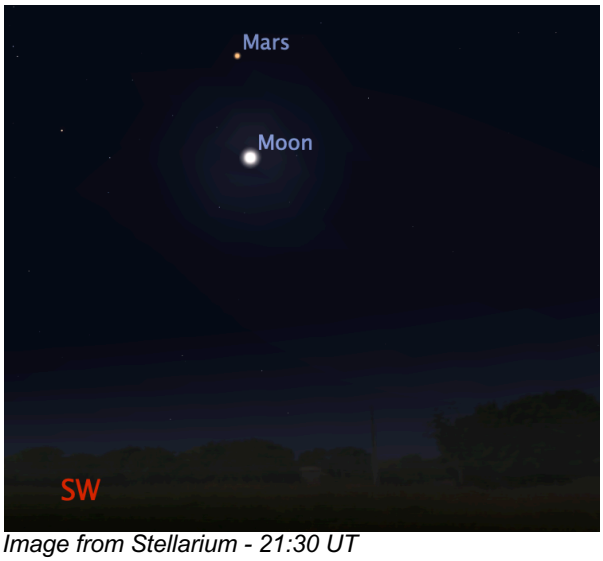


Image from Stellarium - 21:30 UT

During the evening, if clear looking from S round to SW, Mars can be seen lying above the first quarter Moon.

Collected Observations (and thoughts) – Gary Walker

Sun Spots - 28th November

In the latter days of November, after a period of many months where, apart from rare tiny spots, sunspots have been conspicuous by their absence, there has been a sudden rash of spots!

On 28th November, for example, there were at least three separate spot groups, with one medium-sized spot about to exit, and a huge spot, lower down, which had a complex umbra, surrounded by a large penumbra.

This one resembled the microscopic view of an amoeba, in that it had a “leading” medium-sized spot “ahead” of it, with a few small spots dotted around nearby. As if this was not enough, there was another tiny spot that had just emerged over the limb This, clearly represents the beginning of the new cycle!

Mars is shrinking! - 2nd December

Following Opposition in early October, Mars is now steadily shrinking in angular size. On 1st December, in my scope, with a magnification of 333X, Mars appeared to be about the same size as a naked eye Full Moon. At 222X, it appeared to be only about half the size of the Full Moon.

Mars was now down to 14.4' arcseconds size, not much bigger than it appears at its most distant oppositions (i.e. 13.7' arcseconds).

However, back at the end of September, Mars appeared to be about the same size as the Full Moon with magnifications of 166X-222X. Mars was then nearly at its closest, with an angular size of 22.4' arcseconds.

During this "season", I have seen a beautiful blue/violet colouring over the Northern limb, which is known as the Northern Polar Hood (a haze). I wasn't originally sure if it was just an effect caused by my telescope, but I have seen it in many images, so I know that it is real! I don't remember seeing it at previous oppositions.

Also during this "season", apart from the main dark features, I have seen the South Polar Cap, and the previously mentioned North Polar Hood.

We have been fortunate during this opposition in that we have not suffered planet-wide dust storms (as happened in the last opposition in July 2018), but I have now seen reports of a dust storm, that threatens to be a planet-encircling one.

Mars was still very bright at the beginning of December.

Mars again! - 8th December

Mars is now about 2 months past Opposition (i.e. 6th - 8th December), and I could see that it was now getting really small. Although I could still see dark features on it, it was getting harder to see what features they were, even at 333X magnification (in the last few months, 222X had been ample).

Mars was now down to 13.7' arcseconds in size. Interestingly, this is the maximum size that Mars attains, at its most distant oppositions, so this year we were really privileged for it to reach 22.6' arcseconds in size. The phase was now noticeably gibbous again.

The Great Conjunction of Jupiter and Saturn - 20th December

Jupiter and Saturn have been fairly close to each other throughout Summer and Autumn, at about 7°-8° apart, but in December they started to really close up for the Great Conjunction of 21st December. Needless to say, it was cloudy that night, but fortunately I had a wonderful view of them, on the previous night, 20th December.

With the naked eye, they were easily still separable, and in binoculars they made a beautiful sight, like a bright double star.

However, in my 8"SCT, they really appeared spectacular! They were easily visible in the same field of view, at 222X power. I could also just fit both of them in, even at 333X magnification!

That said, I found that the best view was with the 62X and 100X powers. With them, I could see 2 of the Galilean Moons extending off to the Eastern side of Jupiter. A third "moon" was actually a magnitude 7 star, going by the memorable designation of HIP 99314! However, it could have been mistaken for a moon, as it was in line with the Galilean Moons!

The moons stretched out so far on the Eastern side of Jupiter, that if Jupiter and its moons could have been turned at right angles, they would have nearly reached Saturn! The other two moons were also in view to the West of Jupiter.

On this night, Jupiter and Saturn were 9.1' arc minutes apart; on 21st December, they were at their closest at 6.1' arc minutes apart.

Naturally, Jupiter always appears bigger and brighter than Saturn. In any case, Saturn is

about twice as far away from us as Jupiter so, contrary to appearances, they are not really close to each other at all! That would not, of course, make any difference to the Astrologers, who must have thought that their "star had risen"!

There was quite a bit of coverage in the media, with it being compared with the "Christmas Star". Indeed, there was such a conjunction of Jupiter and Saturn in 7 BC, about 1 degree apart, on three separate occasions in that year.

Conjunctions are not scientifically important, but they are wonderful to see and image. They also provide an excellent example of "compare and contrast" questions, as it is very rare to be able to see two planets in the same telescopic field of view!

Jupiter and Saturn Conjunction - 27th December

This conjunction provided me with a useful opportunity to calibrate the field of view of the 333X eyepiece on my 8" SCT.

On 27th December, the 2 planets were about half a degree apart, which is about the same size as the Full Moon. I first managed to get both Jupiter and Saturn in my telescope field of view with 62X on 15th December. By the 17th, I could just get them together with 100X, and on the 19th, I could see both together with 166X magnification. On the closest (and clear!) night, I could fit both of them into the field of view even at 333X!

As the pair were 9.1' arcminutes apart on the 20th, and were both visible with the 333X eyepiece, it means that at least I now know the size of that eyepiece's field of view!

By 25th December, I could only fit them both in at 100X, and by the 27th, it was back down to the 62X magnification again.

Most of the time, however, apart from the 20th, the most beautiful views were with binoculars, or the naked eye!

December Meeting Reports - Stephen

We were treated to not one, but two meetings during December. The first, on 10 December, was a second attempt at Bob Mizon's presentation on Astrophotographers, held via Zoom. Bob's first attempt at this presentation in October was scuppered by a technical issue, and was abandoned half-way through, so we were very grateful that he agreed to come back this month to try again. Bob gave an excellent presentation comprising a collection of astro-images that he has collected together from imagers around the World, and of course, talking us through some of the objects and phenomena contained within them. Bob also covered topics including the Campaign for Dark Skies and the All-Party Parliamentary Group for Dark Skies, as well as introducing us to the concept of Spode's Law - that *wherever an astronomer is in the World, there will be a cloud between them and what they want to look at!* I think we can all relate to that!

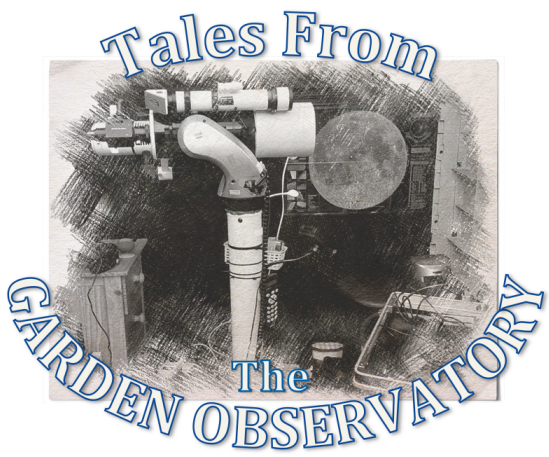
The following evening we held our 2020 Annual General Meeting, also via Zoom. We were not sure how well this would work, but it actually went very well, and there was the added advantage that the Officers' Reports had been circulated by email prior to the meeting. Reports were given by the Chair, Secretary and Treasurer, and there was a special report from Paul Evans on progress with the Maurice Gavin Observatory (MGO) project. Committee members for 2021 were elected, and votes of thanks proposed and seconded. After the formal part of the meeting was completed, we honoured the tradition of the AGM Quiz, prepared by Susan Stangroom, using questions from a 1985 quiz that she found in the Society's archives. It was a *very* challenging quiz, that provoked considerable mirth and banter from all participants, and was won by Ron Johnson, with a score of 6/10 - which just goes to show how hard it was! After the quiz, Stephen presented the December Sky Update, which is now uploaded to our YouTube channel.

Zoom meetings are becoming much more successful as we all begin to learn how to use the platform, and they are likely to be with us for a while yet, as there are no signs of COVID or pandemic restrictions going away any time soon. Zoom is proving to be quite a valuable tool that we may utilise much more going forward - particularly when speakers are unable to travel to us. But we acknowledge that there are still some members who are not able to access Zoom meetings, and we will be looking at ways to ensure that they are included going forward. We would like to thank all of our members for the patience that they have shown while we learn how to use these online resources, which have been new to many of us on the Committee. It has been a steep learning curve for us all, but hopefully we are beginning to master it now.

I would like to urge any members who are not currently able to access Zoom meetings, whether it is because you don't have access to the internet or a suitable device to use, or whether it is just that you don't know *how* to access it, to please get in touch, and I will be pleased to help in any way I can.

ewellastro.engagement@gmail.com

More from Stephen!



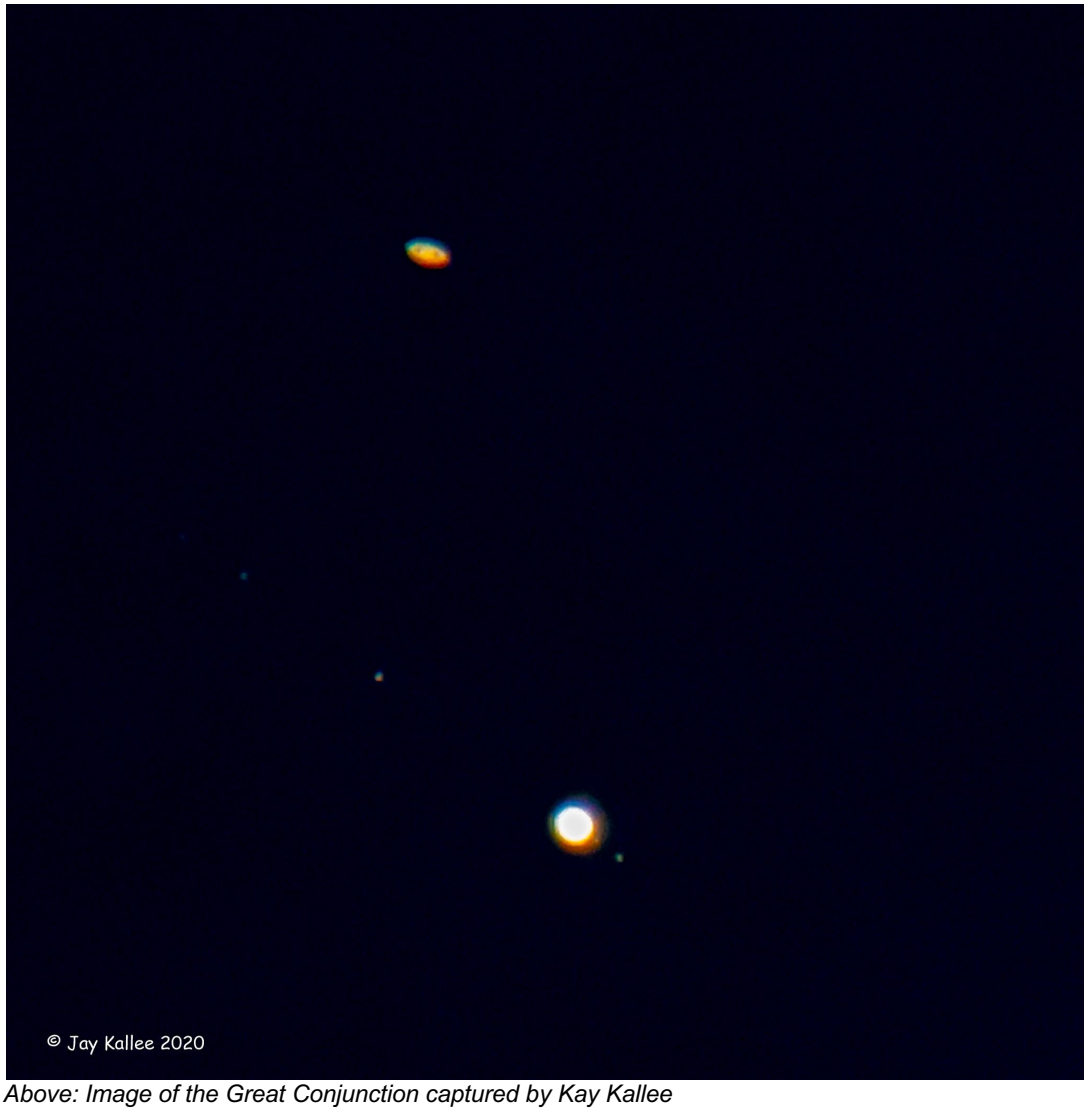
Due to a combination of some health problems (hats-off to Kingston Hospital, who are truly amazing!), and a recent return to full-time working after 18 months of being semi-retired (I suspect the two factors are not entirely unrelated!), I have to admit that the observatory has stood idle for over a month. The weather hasn't helped either, although I confess that I have passed-up the opportunity of a couple of really clear nights amid the otherwise drab, damp weather.

One of the biggest challenges has been managing condensation. The observatory, being a plastic structure, is prone to condensation forming on the underside of the roof, and there is a general theme of damp throughout. Paperwork, if left out there, quickly becomes soggy, and there is a damp smell. The telescope and mount, of course, are designed to cope with damp and condensation, but where there is moisture, there will soon be mould and I doubt that my Hydrogen-alpha scope will benefit much from a damp environment. So I have had to install a fan heater to dry things out. A heater of any kind, of course, is the last thing you want in an observatory, but I have found that by putting it on for an hour or so during the daytime, I can drive the temperature in the observatory over 20°C, which in turn triggers the extractor fan, which in theory sucks out the warm damp air. By night-time of course, everything has cooled back down to ambient temperature.

Mysterious goings-on have continued. The power supply to the observatory is via an extension cable that runs off an outside socket on the nearby chalet wall, and I came outside one morning in early November to find it unplugged and lying on the hard-standing next to the observatory. This was only a minor inconvenience that meant re-setting the observatory clock, but it does make me wonder what on Earth goes on in my garden at night! I know that foxes are quite active out there late at night, and I wonder if one of them got snagged in the cable and yanked it out of the socket - I am hard-pressed to think of any other explanation. Anyway, I have secured the cover over the socket now, which will stop the plug from being pulled out again.

The Great Conjunction of Jupiter & Saturn - Stephen

The main event of December 2020 - the Great Conjunction of Jupiter & Saturn - was quickly dubbed “The Star of Bethlehem”, amid conjecture that such a conjunction could be a possible explanation for the appearance of the holy star that led the way to the newly-born Messiah. But we in the UK were becoming resigned to the fact that we weren’t going to see it, due to a combination of an atrocious weather forecast, and the fact that the two planets would be so desperately low in the sky at nightfall.



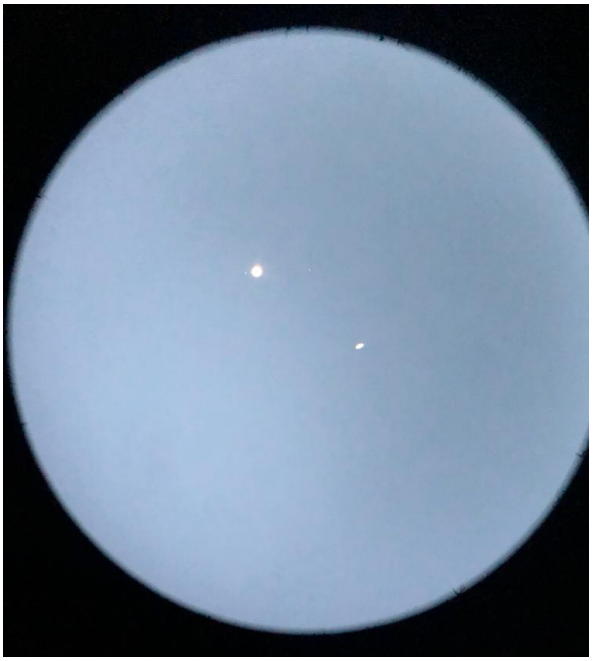
Above: Image of the Great Conjunction captured by Kay Kallee

The night of 21st December was the closest alignment of the two planets, but when the skies cleared on 20th December, our members sprang into action to capture the spectacle. The difficulties were pretty much universal for everyone - trying to see the two planets above local rooftops and trees - and having just moved into a T4 COVID lockdown, it was unclear whether or not it was permitted to travel to a location with a clear horizon. But our intrepid members were undeterred, resorting to leaning out of Velux loft windows, and in one case, even getting slapped with a parking ticket for jumping in the car to get to a clear horizon! You really do have to admire the dedication of our members sometimes.

Above: John Davey
Right: Julia Gavin
Below: Matt Graydon

Above: Norman Jones

Above: Paul Evans



Above: Sagar Shringarpure

Above: Shirish Phade

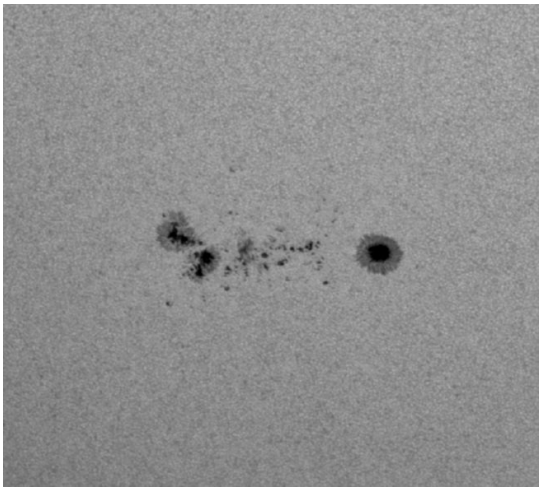
The flow of images to our *WhatsApp* group was astounding, and I was particularly grateful for this as I was stuck at home, unable to acquire a clear horizon to see the event for myself. I had to be content with looking at the Moon, which on that night, was 36% illuminated and razor-sharp in the excellent seeing conditions.

Despite its closeness to Christmas, this was by no stretch of the imagination, "The Star of Bethlehem", and from images that I have seen from around the World on 21st December, the two planets were undeniably very close, but remained unmistakably two separate objects.

What a fantastic way to end 2020 - a bittersweet year of lockdown misery and extraordinary astronomy. My sincere thanks to all who have shared their fantastic images of this historic event. I have uploaded all of these to the observations archive on our secure online drive.

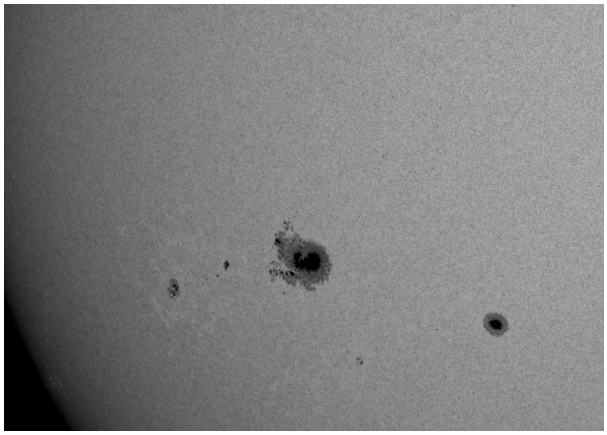
Solar Activity Report November/December 2020 - Stephen

Solar Cycle 25 has certainly got off to a dramatic start, with some impressive active regions and solar flares. Considering that we only saw the last Cycle 24 active region back in July, to be seeing the current level of solar activity this early in a new cycle is unexpected.

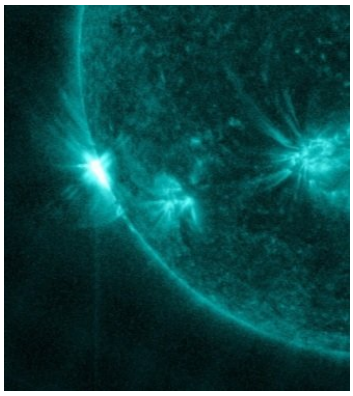


Left is AR2781 seen here by the Solar Dynamics Observatory (SDO) space telescope on 2020-11-08. This was a very magnetically complex active region of the sort that we would generally expect to see closer to a solar maximum. Sunspot groups like this have the potential to produce powerful solar flares and to throw huge clouds of material into space called Coronal Mass Ejections (CME). If these are thrown toward Earth, they often cause geomagnetic storms.

AR2786 (Right), seen here by SDO on 2020-11-27, was another magnetically complex active region, with a giant primary sunspot - the biggest we have seen in years - nearly twice the size of Earth (umbra).

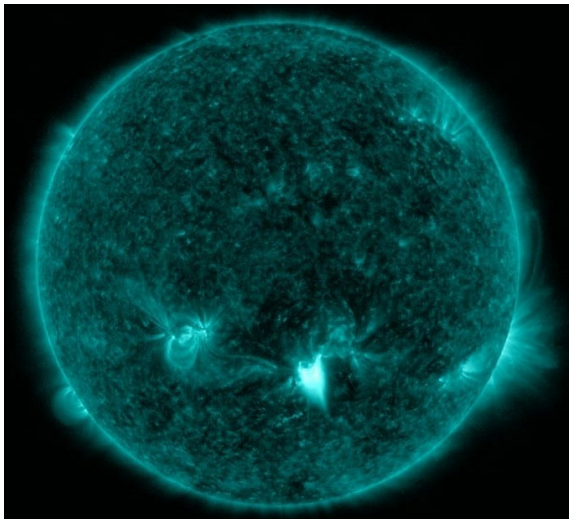


The potential for these complex active regions to produce powerful solar flares is enormous, due to their magnetic complexity, and we have seen some powerful solar flares already in the last couple of months.

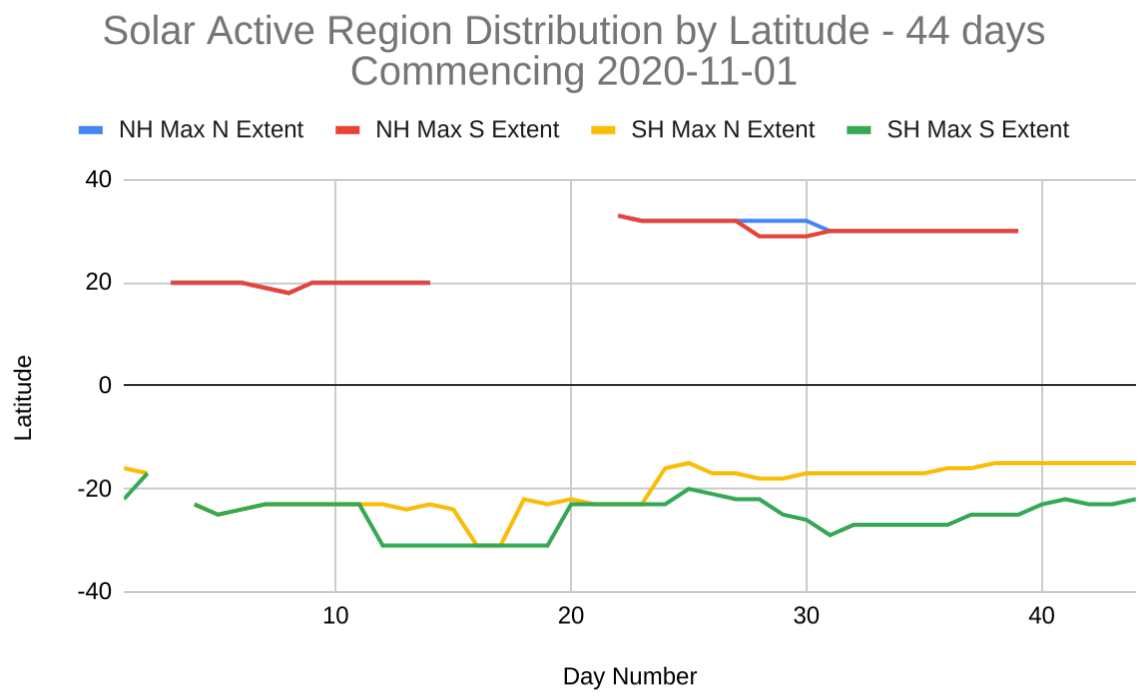


On 2020-11-29, a massive M4.4 flare - the most powerful of Cycle 25 to date, exploded from behind the Sun's southeast limb. Its origin active region could not be determined because we could not see it. There was also a CME, but fortunately neither the flare itself nor the CME were Earth-directed. The solar flare, however, did cause HF radio blackouts on the daylight side of the Earth.

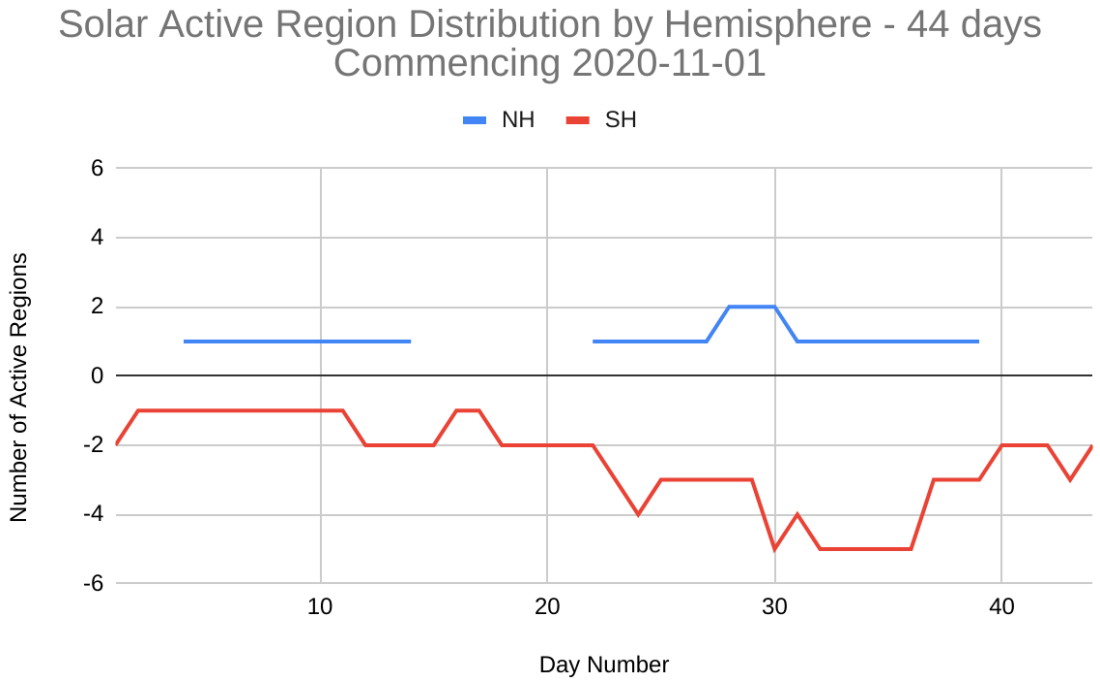
AR2790 produced a powerful C7 solar flare on 2020-12-07, which due to the position of the active region on the solar disk, was Earth directed. There was an accompanying CME, and it was feared that this would cause a major geomagnetic storm when it reached Earth, but due to the polarisation of the CME, the geomagnetic storm did not occur, much to the disappointment of UK aurora hunters.



Much of the work that I do in Solar Astronomy is about tracking the solar cycle progression, and this is done partly by monitoring the latitudes at which active regions are seen. The closer we get to solar-maximum, the closer active regions appear to the solar equator. I have taken a reference period of 44 days commencing 2020-11-01 and produced a graph of active region distribution by latitude, which shows pretty much what we would expect at this stage of the solar cycle, with activity being confined to the higher latitudes. What is also noted is that there seems to be more consistency of activity in the southern hemisphere of the Sun.



An analysis of active region distribution by solar hemisphere, confirms that this is indeed the case - that the southern solar hemisphere is currently more active than the northern hemisphere.



The values of active region numbers have been converted to minus values in the above chart in order to place them below the equator for comparison. During the reference period, we have seen up to 5 active regions at a time in the southern hemisphere, as opposed to a maximum of 2 at any one time in the northern hemisphere. This hemisphere asymmetry of solar activity is a well-documented anomaly and is in keeping with the observed shift of activity from the northern hemisphere to the southern hemisphere toward the end of Cycle 24.

Whether the current level of solar activity will continue, or will decline again is uncertain, but it is encouraging to see so much activity at such an early stage of the solar cycle.

Up Next:

NEXT MEETING: 8pm Friday 8 January 2021 - Virtual meeting via Zoom

Dr Matthew Bothwell from University of Cambridge will talk about the Search for massive galaxies hidden in the early Universe.

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

Suspended until further notice.

AD HOC OBSERVING AT WARREN FARM:

Suspended until further notice.