JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

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Editorial

Welcome to the May edition of Janus. This month's lecture on Planetary, Lunar and Solar Imaging, to be given by Ivana Preanic, is certain to be of particular interest to the many members bitten by the imaging bug! There will also be the customary presentation on the sky at night for the upcoming month, given by Ron Johnson, who, in future months, will rotate as presenter with Shirish and Martin.

Unsurprisingly, the 8 April total solar eclipse, visible across large areas of the North American Continent, attracted much attention in the media and was witnessed first-hand by Shirish. Sadly, there is no opportunity to witness one over significant parts of UK until 2151, although there will be one in Spain in August 2026 – weather permitting – which will be around 96% in SW England.

Last summer, NASA announced that it was going to set off for a faraway asteroid named 16 Psyche, which orbits the Sun between Mars and Jupiter at a distance ranging from 235 million to 309 million miles (378 million to 497 million kilometres) from the Sun. It is believed to contain precious metals, including gold, iron, and nickel, which could (allegedly) be worth the eye-watering sum of $10^19 (that's $10 million, million, million!) – enough, that if NASA were to successfully mine the asteroid and bring it back to earth, every person on the planet would essentially be made a billionaire. Just as well that NASA has said mining the asteroid isn't its intention - it launched the mission in to learn about planetary cores and how planets form. See: *https://www.unilad.com/technology/nasa/nasa-asteroid-16-psyche-earth-billionaire-028883-20240418* for more detail on this and the OSIRIS-REx's asteroid Bennu sample.

John

SkyUpdate
What's up this month?

The Solar System May

MERCURY: begins the month emerging into the morning sky as it approaches greatest elongation west. It will be extremely difficult to see, reaching its highest point in the sky during daytime and being 4° below the horizon at dawn. It ends the month soon passing behind the Sun and remains difficult to see reaching its highest point in the sky during daytime and being on the horizon at dawn.

VENUS: will soon pass behind the Sun, and begins the month difficult to see, reaching its highest point in the sky during daytime and being 2° below the horizon at dawn. By the end of the month, it is not readily visible, being very close to the Sun, at a separation of only 1° from it.

MARS: begins the month having recently passed behind the Sun at solar conjunction. It will be 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, emerging from behind the Sun it remains difficult to see, reaching its highest point in the sky during daytime and being no higher than 4° above the horizon at dawn.

JUPITER: begins the month soon passing behind the Sun at solar conjunction. It will be extremely difficult to see, reaching its highest point in the sky during daytime and being no higher than 4° above the horizon at dusk. Although becoming slightly easier to see as the month progresses, it ends the month still difficult to see, reaching its highest point in the sky during daytime and being 1° below the horizon at dawn.

SATURN: 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 only 4° above the horizon at dawn. By the end of the month, emerging from behind the sun it is visible in the dawn sky, rising at 02:11 - 2 hours and 37 minutes before the Sun - and reaching an altitude of 13° above the SE horizon before

fading from view as dawn breaks at around 03:44.

URANUS: will soon pass behind the Sun at solar conjunction. Throughout the month it is extremely difficult to see. It begins the month very close to the Sun, at a separation of only 11° from it and, even by the end of the month, is still at a separation of only 15° from it.

NEPTUNE: recently passed behind the Sun at solar conjunction and, throughout the month, is very difficult to see. It begins the month reaching its highest point in the sky during daytime and being 5° below the horizon at dawn. By the end of the month, it will still reach its highest point in the sky during daytime and be no higher than 1° above the horizon at dawn.

MOON PHASES:

Last Quarter	1 May
New Moon	8 May
First Quarter	15 May
Full Moon	23 May
Last Quarter	30 May

Notable Events:

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

May

4 Close approach of the Moon and Saturn
Lunar occultation of Saturn
Close approach of the Moon and Neptune
Lunar occultation of Neptune

5 Close approach of the Moon and Mars
Lunar occultation of Mars
η-Aquariid meteor shower 2024

6 Conjunction of the Moon and Mercury

8 η-Lyrid meteor shower 2024

9 Mercury at greatest elongation west

10 Lunar occultation of Beta Tauri

12 Messier 5 is well placed

13 Uranus at solar conjunction

14 Conjunction of Mercury and Eris

15 Mercury at dichotomy

17 Asteroid 2 Pallas at opposition
Comet 46P/Wirtanen passes perihelion

18 Jupiter at solar conjunction

19 Mercury at highest altitude in morning sky

24 Lunar occultation of Antares

29 Messier 4 is well placed

31 Conjunction of Mercury and Uranus
Close approach of the Moon and Saturn
Lunar occultation of Saturn

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

Collected Observations (and thoughts) – Gary Walker

Comet Again! – Posted 7 Apr

Reinforcing the message of how bad the weather has been, I have only managed to see the Comet again, tonight (7 April). The last time that it was clear was over a week ago on 30 March!

Virtually every day and night, if it has not actually been raining, it has still been overcast all the time. If there have been any breaks, they have been useless for observation! Every day and night have been the same, with endless cloud moving across, but not changing at all!

Even if it has not been the usual thick cloud overcast, there has invariably been the accursed cirrus cloud all over the sky. Cirrus cloud is actually worse, for any faint objects like Comets or Deep Sky objects!

The comet is now competing with the twilight, as well as being very low down, so it was not seen so well, as before. Nevertheless, I could still just pick out the tail!

Even the Sun has not been easy to observe; as they say on the weather forecasts, it has been in "short supply"!

Press Coverage of the Total Solar Eclipse – Posts from 8-10 Apr

On 8 April, a Total Solar Eclipse crossed North America in the early evening (our time!).

I was amazed that the coming eclipse was THE Top Story on the BBC 1 pm News. The item showed people in Texas preparing for the coming eclipse, even though, currently, the weather was cloudy!

Come the 6pm BBC News, the Total Eclipse story was down to the second news item, but still quite impressive for a space related story! This showed people preparing for it, but it still hadn't yet started!

It also showed people waiting to see a Partial eclipse from the coast of Ireland. Needless to say, it was wet, windy, and overcast there!

The eclipse, as a partial one, was visible from the Western UK, but not nearly as far East as the London area. In any case, it would only be a small partial eclipse, visible close to sunset and, of course, there are usually clouds in the way, near the horizon!

However, on the BBC News at 10pm, the Total eclipse was again the Top Story! This is unprecedented, as usually these stories end up in the "and finally" spot at the end of the News! In fact, this eclipse was covered much more than the one in 2017. They said that it was the most observed eclipse in history, with at least 31 million people living in the path of totality!

The eclipse again featured at the end of the News, with a report from the watchers on the Western coast of Ireland, but it was too cloudy for them to see it! Even the Astronomer Royal spoke about total eclipses, too!

I "observed" the Total Eclipse on the Sky News feed, and could see the track of the eclipse as it crossed from Mexico, via Texas, Arkansas, Indianapolis, to Vermont, and Maine, and into Canada, in about an hour and a half! The total eclipse was crossing the American continent between before 7.30pm and 8.40pm, (our times!).

Some of the TV reporters were interviewing people DURING TOTALITY itself, which serious astronomers would not have welcomed! Some people used flash to try and photograph it - as if that would help! In one place, the TV crew had their camera lights on, which would largely negate the experience of darkness, but at another site, they had the good sense to switch their lights off, so that you could see how dark it got! The 360 degree sunset glow was visible around the horizons, where sunlight is visible outside the totality track. Of course, the Diamond Rings, Prominences and the Corona were also clearly seen! Some people commented on the sudden temperature drop.

One man had been to 30 totalities! This is a target to which all in our Society should aspire!

In Arkansas, no less than 300 couples were getting married during the eclipse!

I was pleased to see that Carbondale, Illinois, had clear skies, as they were one of the very few people to see totality only 7 years ago, in August 2017! You could hear the high emotions of the crowds gathered there, and one young child had started to cry. However, a dog did not seem to take any notice of the eclipse!

There were the usual fears of cloud cover and, indeed, clouds were being a nuisance in some places, but luckily cleared enough to see the eclipse!

To cap it off, The Sky at Night programme also returned on the evening of 8 April, after a 3-month break!

So, WHAT an astronomical evening this was, even for those of us who were not fortunate enough to be in the path of totality!

On 9 April, all the national newspapers had good reports of the eclipse. The 1pm BBC News was STILL doing a report on it! I winced when the female commentator referred to this "ASTROLOGICAL event"!

Unusually, some places such as Carbondale, Illinois, also saw the 2017 Totality, only 7 years ago which is uncommon for total eclipse, as the AVERAGE time between total eclipses being seen at any given site is 375 years! However, being an average, it could either take far more than 375 years, for the same place to see another eclipse, or else, only a few years, as in this case!

In Southern England, this happened in the years 1715 and 1724, only 9 years apart, with 2 total eclipses being seen from the London area! So, it is about 300 years since this part of England has witnessed a total solar eclipse, and there STILL won't be another one until 2151, i.e. about 127 years to go! Thus, it will be about 427 years between the last totality, and the next one!

After that, the next two total eclipses don't cross our area until the years 2600, and 2726! Those two, are at least, 576 and 702 years from now! Thus, in our area the average wait time is significantly greater than it should be, although with the various Saros Cycles occurring at the same time, this means that total eclipses are random over a given area, even though such eclipses occur about every 18 months, approximately!

The total eclipses occurring over the British Isles between 1 AD and 3000 mostly cross either Cornwall or especially, Scotland, although in a different 3000 year period, things could be entirely different, with our area getting more than its fair share of eclipses!

Even on 10 April, there was a brief item and picture of the eclipse on the BBC News, saying that Bonnie Tyler's hit song, "Total Eclipse of the Heart" had soared in popularity since this eclipse!

Actually, Bonnie Tyler has said that at every total solar and lunar eclipse, her song gets a lot of renewed attention! Her song first came out in 1983, and was comparing the end of a romance to an eclipse!

After the 2017 Total Eclipse, her record sales soared by 503%! She is actually not the first singer to reference an eclipse, as Carly Simon released her record, "You're so Vain" in November 1972. In her song, she sings "Then you flew your Lear Jet up to Nova Scotia to see the Total Eclipse of the Sun". This Eclipse was probably the one of 10 July 1972, which did cross Nova Scotia!

When you saw how much the media covered this Eclipse, even making the Top Story, it is in sharp contrast to last year's Annular Eclipse passing across Mexico and Texas. This only merited the "and finally" item, after the sports reports! It was very much a "blink and you'll miss it", as it only showed a few photos and there was no on-site report, which just proves how fickle the Media is!

The Sun and other observations – Posted 22 Apr

On its recent odd appearances since mid-April, I have seen a "swarm" of small-to-medium size sunspots upon the Sun. With them, and a few other spots, there have been up to 20+ individual spots present upon the Sun, at the same time!

The Sun is, of course, approaching Solar Maximum, probably next year.

The comet Pons-Brooks, although still technically in the sky, is getting very low down. As a result, I have not been able to see it since 7 April, as when it would be dark enough to see

it, it is too low down to see, and when it would be high enough to see it, the sky is still too bright to see it - a typical "Catch 22" situation! Also, no stars can be seen with which to align the GOTO!

The weather has remained poor for night-time observations and, of course, the Moon was starting to interfere again, when there was a clear night!

Voyager 1 working again … for now! – Posted 23 Apr

On the BBC News today, it was announced that scientists had fixed the problem with the Voyager 1 probe. It has been sending gibberish messages for about 5 months now, so they had to do a "reboot" - must be the most distant reboot in history!

Voyager 1 was launched in 1977, so it has now been out in space for over 46 years. It is the most distant man-made object from the Earth, at about 15.1 billion miles away! Any communication between Earth and the probe takes at least 22.5 hours, one way.

This probe passed by Jupiter and Saturn and took the famous "Pale Blue Dot" image of Earth from 3.7 billion miles away, in 1990.

In 2012, it was the first object to leave our solar system, when it crossed the Heliosphere and moved, officially, into interstellar space! However, it will still be within our system, as it will still be under the gravitational influence of our Sun, even at that distance. And, it has many years before it will even reach the Oort Cloud, not to mention crossing it.

It is worth noting that this probe, like all probes, is not "state of the art" technology wise, and hasn't been since the day it was launched, as it has 1960's technology! Thus, it is not easy to find modern technology in order to keep it operating!

Despite this recent "fix", the probe is expected to be switched off next year, as the Plutonium in its RTG is running out.

The rising flood of space junk is a risk to us on Earth – and governments are on the hook

Acknowledgement: This article was written by Thomas Cheney, Vice Chancellors Research Fellow, Northumbria Law School, Northumbria University, Newcastle and was first published in THE CONVERSATION on 17th April 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/the-rising-flood-of-space-junk-is-a-risk-to-us-on-earth-and-governments-are-on-the-hook-227583*

A piece of space junk recently crashed through the roof and floor of a man's home in Florida. NASA later confirmed that the object had come from unwanted hardware released from the international space station.

The 700g, 10cm-long piece of hardware was expected to burn up, NASA said. Even a relatively small piece of junk can cause considerable damage when falling from space.

This raises several important questions. Who is liable for damages caused by human-made objects that fall from the sky? Can anything be done to prevent this happening? Luckily, international treaties provide some answers to the first question, while recent developments help with the second.

The outer space treaty of 1967 says that the country that authorised the launch (known as the "launching state") is responsible for damage caused to people or things on Earth. The UN's liability convention, which came into force in 1972, also makes this liability absolute for damage on Earth or to aircraft in flight.

The concept of absolute liability means that responsibility applies regardless of whose fault it was. Countries are also liable for spacecraft and rocket sections launched by private companies. This is because article 6 of the outer space treaty makes nations responsible for the activities of their citizens in outer space.

So, if a piece of space junk launched by one country lands in another, the launching state is responsible for any financial compensation that may result from the costs of damage or clean up. It is important to note that these principles relate to international law. A US object damaging US property is a matter for US law.

All objects in Earth orbit are falling towards Earth. Active satellites engage in “station keeping” to remain in their intended orbit. Inactive satellites – those that no longer work or are disabled in some way – will not be able to perform this task.

Their orbits will steadily drop until they re-enter the Earth’s atmosphere. Of around 11,000 satellites in orbit today, about 3,300 are estimated to be inactive.

There are two main options for best practice when the lifetime of an active satellite comes to an end. One is to either move the satellite into a higher orbit - known as a graveyard orbit - in order to delay the date of re-entry (by hundreds, or even thousands of years).

Another is to re-orient the satellite to ensure that it either re-enters in a manner that ensures it burns up in the atmosphere or that it can cause only minimal damage on the ground.
However, due to malfunctions or damage, some space objects still undergo an unplanned re-entry through the Earth’s atmosphere and can thus land anywhere. Earth is big, however, so the risk of a given space object causing harm to people or property is low, particularly as a space object also needs to survive the searing heat of re-entry which causes many pieces of space junk to burn up.

However, space junk can sometimes reach the ground. Some, such as debris from Skylab, the first US space station, came down in western Australia in 1979 but caused no damage. Other space debris, like Cosmos 954, a Soviet nuclear-powered satellite, spread dangerous radioactive debris across northern Canada when it re-entered in January 1978.

While that clean-up cost the Canadian government CA$14 million (about £5.3 million at exchange rates from four decades ago), the Soviet Union reimbursed the Canadian government for CA$3 million. This remains the most significant test of the space treaties and shows the limitations on the protections provided by international law because the compensation was a fraction of the clean-up cost.

The object that recently damaged the home in Florida was American, so that incident will not test the space treaties, as the incident occurred on US soil and will therefore be a matter for US law.

However, it is illustrative of the legal hazards of the proliferation of space objects without adequate end of life planning. The more objects launched into outer space, the more of them will return to Earth. Indeed, they will all eventually enter the atmosphere and not all of them will burn up in the process.

Mitigating space junk

Two sets of UN guidelines present an encouraging picture for what happens to space debris. Recent work to incorporate more long-term planning into these non-binding agreements encourages the development of end-of-life plans for space objects such as satellites.

The guidelines are primarily aimed at dealing with the growing problem of space debris rather than preventing objects from causing damage on Earth. However, planning for the end of a space object's life will also reduce the risk of an impact on the ground.

A piece of space junk should re-enter on a trajectory that guarantees that it burns up or crashes somewhere it is unlikely to do damage. While the guidelines are non-binding, the liability provisions of the space treaties are not, thus motivating compliance by launching states.

The risk of a piece of space junk crashing through the roof of your house remains very low. As more spacecraft are launched though, the risk from falling space junk will edge up marginally.

However, space law is on your side, and efforts to tackle the problem will reduce the risk to people and property.

Object of the month – The Leo Triplet - Martin Howe

Galaxies are often found in groups or clusters (or even "super clusters"), with some of the larger clusters visible during the summer months. Groups of galaxies are collections of up to 100 gravitationally-bound galaxies, whilst clusters could contain one thousand or more individual galaxies. Super clusters are larger still, comprising of a collection of clusters. Two of the better-known clusters are the Virgo cluster and Coma cluster, each bearing the name of their respective host constellation, and both of which are summer constellations. This is why the summer months are often referred to as the galaxy hunting season as there are many more on show than over the winter months. However, this can prove frustrating as the galaxies tend to be very faint and require dark skies to see them at their best, and of course over the summer months the hours of astronomically dark skies are limited (let alone clear skies and skies free of light pollution!).

At the other end of the size scale are the groups of galaxies. Our Milky Way galaxy is part of a small galaxy group of several dozen galaxies known as the Local Group. The main three galaxies in the group are our own galaxy, the Andromeda galaxy (M31) and the Triangulum galaxy (M33). The remainder are dwarf galaxies, many of which actually orbit one of the other main galaxies. The Magellanic clouds are examples of two dwarf irregular galaxies that orbit the Milky Way.

Another small galaxy group is the rather unimaginatively named M66 Group, but better known as the Leo Triplet. This consists of three relatively bright galaxies that can be observed and imaged even from the light polluted environs of London. They hover around magnitude 9 to 10, so may just be visible to keen-eyed observers using binoculars from a dark sky site, but should be visible through a small telescope. This is a particularly attractive group, as they are relatively bright for galaxies; relatively close together in the sky (within about half a degree, or full Moon's width, of each other); and are all spiral galaxies.

The three components of the group are catalogued as M65, M66 and NGC 3628. Interestingly, NGC 3628 has a very similar magnitude to M65, and yet Messier appeared to overlook the former when compiling his catalogue. This may be due to nuances in the way in which the magnitude of extended objects such as these is calculated. Whereas both galaxies have the same overall catalogued surface brightness, M65 appears to have a brighter core, which may be why it caught Messier's attention.

The group lies about 35 million light years away (for reference, the Andromeda galaxy is a little over 2 million light years distant).

\M65 and M66 are both inclined to our line of sight and their spiral structure is clearly evident, even in images taken through small telescopes. The effect of their mutual gravitational interaction can also be seen in the stretched out spiral arms in M66. NGC 3628 however is seen edge-on to us and is also often referred to as the “hamburger galaxy”!

The image below comprises of 38 exposures, each of 2 minutes duration, taken with a 127mm refractor and a ZWO ASI294MC cooled colour camera. NGC 3628 is seen on the left of the image. M65 is on the upper right with M66 below.

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 10 May – Nonsuch High School

Ivana Preanic will talk about Planetary, Lunar and Solar Imaging.

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 7 May.

The precise date and timings of any session will be advised by email and WhatsApp a few days in advance but should be within the period 1-10 May.

AD HOC OBSERVING AT WARREN FARM:

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