JANUS

THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

October 2021 EDITION

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Editorial

Welcome to the October edition of Janus. Last month saw our first physical meeting since the initial Covid lockdown. It had been a long 18 months and, despite the absence of a coffee (and chat!) break, the meeting brought a welcome return to something approaching normality. Those not keen to brave the physical meeting joined via Zoom which, after a few teething problems seemed to be satisfactory, albeit with some degradation to sound and picture. The October meeting will be similarly "hybrid".

This month sees the 3rd anniversary of the launch of BepiColombo - Europe's first mission to Mercury. Launched on 20th October 2018, it is on a 7-year journey to the smallest, least explored, terrestrial planet in our Solar System. When it arrives at Mercury in late 2025, it will endure temperatures of over 350 °C, and gather data during its one-year nominal mission, with a possible one-year extension. The mission comprises two spacecraft: the Mercury Planetary Orbiter (MPO) and the Mercury Magnetospheric Orbiter (Mio). BepiColombo is a joint mission between ESA and the Japan Aerospace Exploration Agency (JAXA), executed under ESA leadership. Bepi performed a "goodbye flyby" of Earth on 10th April 2020, followed by Venus flybys on 15th October 2020 and 11th August 2021. Most recently, on 2nd October, the mission returned its first low resolution pictures of Mercury as it flew over the planet at a height of only 200km. A further 5 flybys of the planet will be conducted before the mission enters stable orbit around Mercury in December 2025. More information is at: *https://www.bbc.co.uk/news/science-environment-58754882*

John

SkyUpdate

What's up this month?

The Solar System October

MERCURY: begins the month approaching inferior solar conjunction and is extremely difficult to observe - it will reach its highest point in the sky during daytime and is 8° below the horizon at dusk. By the end of the month, it will soon pass behind the Sun, but might just be visible in the dawn sky, rising at 05:10 (BST) – 1 hour and 40 minutes before the Sun – and reaching an altitude of 11° above the SE horizon before fading from view as dawn breaks around 06:30.

VENUS: begins the month emerging into the evening sky as it approaches greatest elongation east. Although observable, it will reach its highest point in the sky during daytime and be no higher than 5° above the horizon in the SW at dusk. By the end of the month, it is visible as an evening object, having recently passed greatest elongation east. Although dusk will be earlier, it will continue to reach its highest point in the sky during daytime and be no higher than 7° above the SW horizon at dusk.

MARS: begins the month approaching solar conjunction when it will pass behind the Sun. It is not readily observable as it is very close to the Sun, at a separation of only 2° from it. By the end of the month, having passed solar conjunction, it remains not readily observable since it is still very close to the Sun, at a separation of only 7° from it.

JUPITER: having recently passed opposition begins the month visible in the evening sky, becoming accessible around 19:01 (BST), 13° above the SE horizon, as dusk fades to darkness. It will then reach its highest point in the sky at 21:59, 23° above the S horizon and continue to be observable until around 01:41, when it sinks below 7° above the SW horizon. By the end of the month, still an early evening object, it is now receding into evening twilight. Becoming visible around 16:58 (BST), 18° above the SE horizon, as dusk fades to darkness, it will then reach its highest point in the sky at 19:01, 23° above the S horizon. It

will continue to be observable until around 22:43, when it sinks below 7° above the SW horizon.

SATURN: like Jupiter is currently an early evening object. It begins the month visible in the evening sky, becoming accessible around 19:17 (BST), 16° above the SE horizon, as dusk fades to darkness. Reaching its highest point in the sky at 20:55, 19° above the S horizon, it will continue to be observable until around 23:41, when it sinks below 10° above the SW horizon. By the end of the month, receding into evening twilight, it is visible from around 17:18 (BST), 18° above the S horizon, as dusk fades to darkness. It will then reach its highest point in the sky at 18:01, 19° above the S horizon. and will continue to be observable until around 20:45, when it sinks below 10° above the SW horizon.

URANUS: is currently approaching opposition and is visible as a morning object. It begins the month visible in the morning sky, becoming accessible around 22:09, when it reaches an altitude of 21° above the E horizon. It will then reach its highest point in the sky at 03:09, 54° above the S horizon before being lost to dawn twilight around 05:41, 42° above the SW horizon. By the end of the month, it will become accessible around 20:05, when it rises to an altitude of 20° above the E horizon. Reaching its highest point in the sky at 01:04, 53° above the S horizon, it will become inaccessible around 05:03 when it sinks below 21° above the W horizon.

NEPTUNE: may be difficult to see this month. It begins the month approaching opposition and is visible as a morning object, becoming accessible around 20:46, when it rises to an altitude of 21° above the SE horizon. Reaching its highest point in the sky at 23:47, 34° above the S horizon, it will become inaccessible around 02:48 when it sinks below 21° above the SW horizon. By the end of the month, it is visible in the evening sky, becoming accessible around 17:58 (BST), 22° above the SE horizon, as dusk fades to darkness. It will then reach its highest point in the sky at 20:46, 33° above the S horizon, and will continue to be observable until around 23:45, when it sinks below 22° above the SW horizon.

MOON PHASES:

Last Quarter	29 Sep
New Moon	6 Oct
First Quarter	13 Oct
Full Moon	20 Oct
Last Quarter	28 Oct

Notable Events:

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

October

2 Asteroid 40 Harmonia at opposition
5 October Camelopardalid meteor shower 2021
8 Draconid meteor shower 2021
9 Conjunction of the Moon and Venus
10 Southern Taurid meteor shower 2021
11 Saturn ends retrograde motion
δ-Aurigid meteor shower 2021
14 Conjunction of the Moon and Saturn
15 Conjunction of the Moon and Jupiter
17 136199 Eris at opposition
18 Jupiter ends retrograde motion
ε-Geminid meteor shower 2021
21 Orionid meteor shower 2021
23 Mercury at dichotomy
24 Leonis Minorid meteor shower 2021
25 Mercury at highest altitude in morning sky
Mercury at greatest elongation west
28 Venus at dichotomy
29 Venus at greatest elongation east

Collected Observations (and thoughts) – Gary Walker

Novae and clouds - 4 Sep

On the evening of 3rd September, I estimated that the RS Ophiuchi Recurrent Nova was at about magnitude 9, so now definitely fading from the magnitude 5 I observed in August!

Nova Cass was about at magnitude 8 again and seems to have stayed at approximately the same magnitude for a while now.

The Editor was certainly correct in saying that there were relatively poor viewing conditions in August! One of the most annoying things about it was that it was often relatively clear early on but, as soon as it became dark, it kept on clouding over. There were several nights where this was the case. I remember a similar thing happening several years ago when, as soon as it got dark, clouds kept on rolling in! The clouds would burn off during the day, only to re-form at dusk, and they kept on coming in from the North Sea - and it was doing this again during August!

Clouds are, of course, the bane of every astronomer's life. Even during the day, when observing the Sun, it is amazing (and galling), that the clear sky breaks are always about 10X smaller than any cloud!

Sometimes, when (impatiently) waiting for a break in slow-moving cirrocumulus cloud to reach the Sun, just when the Sun is approaching the break, the cloud has suddenly expanded, and I find that the Sun is still deep in the cloud! Either that, or a lower, and consequently faster moving, cloud overtakes the first one, and blots out the break altogether! Sometimes, I have thought that a break is heading for the Sun, only to find that it is moving in the wrong direction, and completely misses it! Yet another frustration is where the Sun is moving along the edge, or near the edge, of a big cloud and I realise that, if I was only about a mile or so to one side, I would be in the Sun.

Sunspots – 6 Sep

After a fairly quiet period for Sunspots during August (apart from some in late August), between 4th and 5th September, there was a sudden eruption of spots! There were two groups of sunspots on 4th September, but by the following day there was suddenly a total of four spot groups. Many of the spots were at least of medium size, and three of the groups had numerous spots within them. I haven't seen so many spots upon the Sun, at the same time, for quite a long period!

More observations – 7 Sep

To check on how dark my night sky is, I did the test of how many stars I could see within the Square of Pegasus. I did it on a very clear night (6th-7th September) at about 1:40am. I managed to see at least 7-8 stars in the Square. This means that my night sky has a "limiting magnitude" of 5.5, which agrees with previous observations. The fact that I could see 8 stars means that the seeing conditions can be rated as "good". However, putting this in context, in the darkest skies, up to 35 stars can be seen in the Square, so the condition of my night sky, if given a report would say, "could do better"!

The variable star Mira was reaching maximum in its cycle by early September. It was probably about magnitude 5, or brighter. It was also visible in my 8 X 50 finderscope, and bright enough even in that to still appear clearly orange in colour! Mira goes through a cycle in about 332 days from around magnitude 9 at minimum up to around magnitude 3 at maximum.

I also saw that two of Jupiter's moons were extremely close together, appearing like a double star, but approximately one and a half hours later, they had separated noticeably! Thus, I could see the movement of at least two of the moons, in a fairly short period, in one night.

More on the Square of Pegasus – 7 Sep

The two brightest stars within the Square of Pegasus are of magnitude 4.4 and form a close pair. They are easily visible with the naked eye, but the other stars are much harder to see. The stars vary between magnitude 4.4, down to 5, and then, magnitude 6.4. Obviously, the darker your skies are, the more stars will be visible!

Nova V1405 Cass – 9 Sep

Nova V1405 Cassiopeia first appeared in the sky on 18th March, and after nearly 6 months this Nova is still flaring. It was flaring again on the evenings of 7th-9th September and was probably about magnitude 6-7.

The first Physical Meeting of EAS since COVID began – 10 Sep

On 10th September, the Society had its first physical meeting since the start of the COVID Pandemic. Our last meeting was on 13th March 2020 - a year and a half ago! Since October 2020, we have had to make do with Zoom meetings only - until this evening, when 20 people physically attended the

meeting, whilst a further 14 "attended" on Zoom.

In addition to the speaker's computer, a second computer was set up on a table, facing the projection screen, so that the Zoom attendees could see the presentations. This was not without problems, and it was necessary to adjust the level of the room lights so that Zoom attendees could view the on-screen image. In the room, I could hear an "echo" effect, with the speaker talking and, about a second later hearing the words coming from the computer.

The speaker was Professor Christopher Owen, from the Mullard Space Science Laboratory (we have had quite a few speakers from there, over the years). He gave a good lecture on his part in the operation of the Solar Orbiter Mission, which launched in February 2020, and is just about to start gathering data in earnest!

Ron Canham then gave the usual Sky at Night talk (on the constellation of Capricorn).

Whilst the meeting was nearly normal, there was no tea break - either down in the Staff Room or in the Library - so the Sky at Night talk came immediately after the lecture, resulting in a shorter than usual meeting which finished at 9:30pm.

It felt strange, and surreal, but also exhilarating, to be nearly back to normal (Zoom meetings don't really cut it, somehow!). One definite bonus of not having to attend via Zoom, was that it meant that we no longer had to watch something that appeared like "Celebrity Squares".

More on Nova Cass – 22 Sep

Once again, this Nova has flared from magnitude 8, up to about magnitude 6.5. I noticed on the evening of 17th September that it was brightening again and, certainly by 20th September onwards, it had indeed done so!

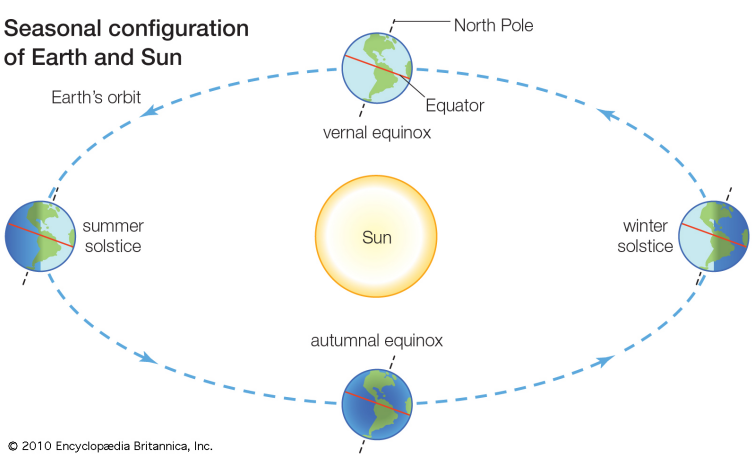
A light curve of this Nova appears just like a hospital temperature chart, as the magnitude curve zigzags wildly up and down, with at least 9 flare-ups!

Having started on 18th March, this Nova has now been going for more than 6 months - how much longer will it go on flaring I wonder?

Solstices and Equinoxes - John Davey

You probably know that solstices and equinoxes signal the changing of the seasons on Earth, but do you know which is which? Are they just different names for the same thing? They are, in fact, sort of opposites, and somewhat akin to the phases of the Moon.

The seasons on Earth change because its axis of rotation around the Sun is tilted at 23.5°. This means that a given point on Earth receives varying amounts of sunlight at different times of the year. If the Earth was not tilted, the Sun would always appear to be directly above the Equator, the amount of light a given location receives would be fixed, and there would be no seasons. There would also be no need to mark equinoxes or solstices.



The diagram on the left illustrates the seasonal configuration of the Earth and Sun.

What is an Equinox?

Twice a year – in March and September – the Earth is positioned so that neither of its hemispheres is inclined towards or away from the Sun. At these instants of time, the Sun is directly above the equator, and both hemispheres receive nearly equal amounts of sunlight – about 12 hours of each. This astronomical event is called an equinox (from the Latin word “aequinoctium”, which means “equal night”). The 2 equinoxes mark the transition from winter to spring and from summer to autumn.

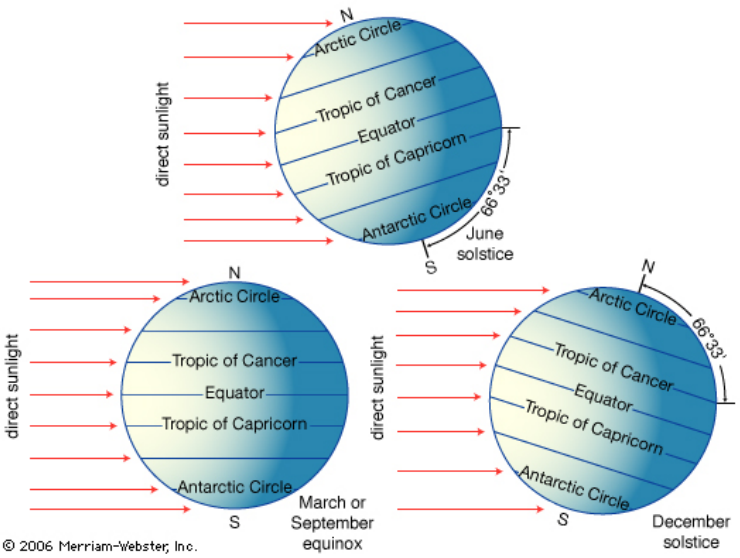
You might ask why, when the Earth isn’t inclined relative to the Sun, day and night aren’t equal in length. Whilst, theoretically, they should be, our planet has an atmosphere that refracts light like a prism, thus distorting things a little. When you’re looking at the setting Sun near the horizon, its actual position is about 1.5° lower than appears to the eye. Atmospheric refraction delays the sunset, which results in more daylight than night-time on the day of an equinox. At temperate latitudes, this difference is about 8 minutes.

Another interesting phenomenon that occurs at an equinox is that the Sun rises due east and sets due west. It’s equally true for any place on the Earth, except for the North and South Poles, where there is no east or west. It happens because, no matter where you are, the due east and due west points on your horizon mark the intersection of the celestial equator with the horizon. On the day of an equinox, the Sun is positioned right on the celestial equator. For this reason, the Sun rises due east and sets due west on the day of the equinox all around the globe. So, if you want to determine where east and west are at your location, just go outside on the day of an equinox and watch the Sun rise and set (assuming it’s not cloudy!)

What is a Solstice?

Between the 2 equinoxes, in June and December, there are days when the Sun’s path in the sky is the farthest north or south from the Equator. A hemisphere’s winter solstice is the shortest day of the year, and its summer solstice is the year’s longest day. In the Northern Hemisphere the June solstice marks the start of summer, when the North Pole is tilted closest to the Sun, and the Sun’s rays are directly overhead at the Tropic of Cancer. The December solstice marks the start of winter, when the South Pole is tilted closest to the Sun, and the Sun’s rays are directly overhead at the Tropic of Capricorn. In the Southern Hemisphere the seasons are reversed.

The diagram on the right illustrates how the Earth is illuminated by the Sun during solstices and equinoxes.



Equinox dates

As noted earlier, equinoxes occur twice a year. The March equinox can occur at any time between 19th and 21st March, whilst the September equinox can happen between 21st and 24th September. Depending on the season, an equinox is called either the spring (or vernal) one or the autumn (or autumnal) one. Note that equinoxes – like the seasons – are reversed in the Southern Hemisphere when compared to the Northern Hemisphere.

On what dates do the first day of the seasons occur?

In the Northern Hemisphere, astronomically speaking, the first day of spring is marked by the March equinox which falls between 19th and 21st of March. In the Southern Hemisphere, astronomically speaking, spring starts on the September equinox which falls between 21st and 24th of September. The corresponding dates for astronomical autumn are 21st - 24th of September in the Northern Hemisphere and 19th - 21st of March in the Southern Hemisphere. Although an equinox happens at the same time all around the globe, for people in different time zones, it can happen on different days.

The 2 solstices happen in June (20 or 21) and December (21 or 22). In the Northern Hemisphere, these dates mark the start of, respectively, summer and winter. In the Southern Hemisphere, they mark the start of winter and summer.

The meteorological definitions of the seasons are different to the astronomical ones. According to the meteorological definition, the first day of spring in the Northern Hemisphere is 1st March. Summer begins on 1st June, autumn on 1st September and winter on 1st December. All the dates are some 3 weeks earlier than the corresponding astronomical date.

Other things to note about solstices and equinoxes

- At the equator, the Sun is directly overhead at noon on the days of equinoxes. If you put a vertical stick in the ground at this moment, it will cast no shadow.
- The Earth isn't the only planet that has equinoxes – in fact, every planet with an axial tilt experiences them.
- The annual date of Easter is tied to the equinox – the holiday is celebrated on the first Sunday after the first Full Moon after the vernal equinox.
- Ancient people knew about equinoxes for centuries. For example, the Pyramid of Kukulcan, built by the Maya between the 8th and 12th centuries A.D., was designed to perfectly align with the movement of the Sun. Every equinox, shadows cast by the Sun created an illusion of a giant snake crawling down the pyramid's steps. The Maya believed it to be the feathered serpent god Kukulkan.
- At a particular time of a day during different seasons, the shadow from the Sun is longest on the winter solstice and shortest on summer solstice

Up Next:

NEXT MEETING: 8pm Friday 8 October 2021 - Nonsuch High School

Nigel Bradbury will give a talk about 'Astrotourism- It's Alive'. Attendance via Zoom will also be possible for those members preferring not to attend in person.

Ron Canham will also deliver his Sky at Night presentation for the month to come.

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

Suspended until further notice.

AD HOC OBSERVING AT WARREN FARM:

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