NEWBURY ASTRONOMICAL SOCIETY
MONTHLY MAGAZINE – MAY 2022

Watching the International Space Station during the summer

Date	Brightness	Start			Highest point			End			Pass type
	(mag)	Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.	
02 May	-2.1	03:06:58	21°	SE	03:06:58	21°	SE	03:09:18	10°	E	visible
02 May	-3.7	04:39:49	11°	WSW	04:43:02	70°	SSE	04:46:21	10°	E	visible
03 May	-1.0	02:19:53	11°	ESE	02:19:53	11°	ESE	02:20:08	10°	ESE	visible
03 May	-3.5	03:52:45	26°	SW	03:54:21	54°	SSE	03:57:37	10°	E	visible
04 May	-3.2	03:05:38	40°	SSE	03:05:41	40°	SSE	03:08:50	10°	E	visible
04 May	-3.8	04:38:56	10°	W	04:42:16	88°	NNW	04:45:37	10°	E	visible
05 May	-1.8	02:18:28	20°	ESE	02:18:28	20°	ESE	02:19:59	10°	E	visible
05 May	-3.9	03:51:20	20°	WSW	03:53:31	82°	SSE	03:56:52	10°	E	visible
06 May	-3.8	03:04:08	51°	SW	03:04:46	67°	SSE	03:08:05	10°	E	visible
06 May	-3.7	04:38:08	10°	W	04:41:29	84°	N	04:44:50	10°	E	visible
07 May	-2.9	02:16:54	38°	ESE	02:16:54	38°	ESE	02:19:17	10°	E	visible
07 May	-3.8	03:49:45	13°	W	03:52:41	84°	N	03:56:01	10°	E	visible
08 May	-1.4	01:29:38	16°	E	01:29:38	16°	E	01:30:26	10°	E	visible
08 May	-3.9	03:02:29	33°	W	03:03:52	90°	WNW	03:07:13	10°	E	visible
08 May	-3.8	04:37:17	10°	W	04:40:37	81°	SSW	04:43:57	10°	ESE	visible
09 May	-3.9	02:15:11	77°	SE	02:15:11	77°	SE	02:18:24	10°	E	visible
09 May	-3.8	03:48:27	10°	W	03:51:48	89°	N	03:55:09	10°	E	visible
10 May	-2.2	01:27:50	27°	E	01:27:50	27°	E	01:29:34	10°	E	visible
10 May	-3.8	03:00:40	19°	W	03:02:57	84°	N	03:06:17	10°	E	visible
10 May	-3.6	04:36:21	10°	W	04:39:37	53°	SSW	04:42:52	10°	SE	visible
11 May	-1.1	00:40:27	11°	E	00:40:27	11°	E	00:40:41	10°	E	visible
11 May	-3.8	02:13:18	50°	W	02:14:05	85°	N	02:17:26	10°	E	visible
11 May	-3.9	03:47:29	10°	W	03:50:48	69°	SSW	03:54:07	10°	ESE	visible

Chart detailing the ISS passes in early May 2022

Although, strictly speaking, satellites are not astronomical objects they are interesting to see and astronomers can't help but notice them as they look up into the night sky. The website www.Heavens-above.com will give the exact time and place where any passing satellites can be seen.

Heavens-above will be able to give details of any satellites that can be seen from your location (if entered). It will give the location in the sky and the exact time that the satellite will appear. So with an accurate clock and pre-knowledge of the position in the sky where it will appear the satellite can be predicted.

As an astronomer it is only right that we first have a look around the sky for any interesting astronomical objects and generally enjoy looking at the stars. Then we can get down to looking out for satellites. As with all night watching activities it always pays to be comfortable so a nice comfortable garden lounger will do nicely. Also make sure you have warm clothes on because it can soon get cold even on a warm summer evening. Most satellites will look just like a moving star. Make sure it does not flash and it will likely be a satellite and not a plane.

NEWBURY ASTRONOMICAL SOCIETY MEETING

6th May — Supernovae - Dr. Phillip Wiseman

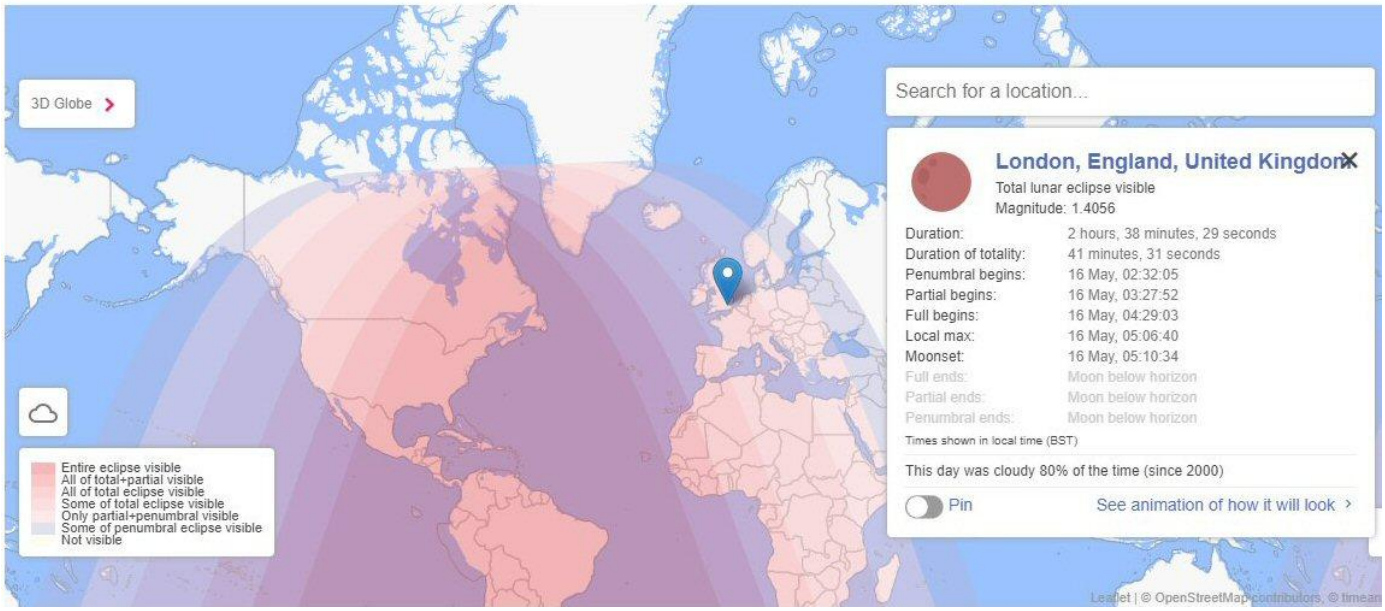
Website: **www.newburyastro.org.uk**

NEXT NEWBURY BEGINNERS MEETING

18th May — Total Lunar Eclipse on 16th May

Website: **www.naasbeginners.co.uk**

TOTAL LUNAR ECLIPSE 16th MAY 2022



A chart showing the extent of the Lunar Eclipse

The Moon will pass through the Earth's shadow between 03:28 and 06:55 BST, creating a total lunar eclipse. The eclipse will be visible any location where the Moon is above the horizon at the time, including from Africa, the Americas, Europe and French Polynesia.

The chart above shows where in the world the Lunar Eclipse can be seen. The darkest pink area is the area where the lunar eclipse can be seen in its entirety. In the progressively lighter areas to the sides of the 'Totality' area (dark pink) progressively less of the eclipse will be seen.

Areas to the west of totality (to the left on the diagram) will see a partial eclipse. In the lightest pink zones only the beginning of partial eclipse will be seen but some of totality may be seen in the darker pink zones. In the central dark pink zone the entirety of the eclipse will be seen.

Zones to the east (to the right on the diagram) will also see progressively more of the eclipse in the darker pink zones. The UK (indicated by the location symbol) is in the third zone where the beginning of the eclipse will be seen. All of the developing partial eclipse will be seen until full totality starts. Unfortunately for us the later stages of totality and final partial phases will be missed as the Moon sets over the western horizon.

ECLIPSE TIMINGS FROM NEWBURY UK

Time	Phase
02:33	Moon enters the Earth's penumbra.
03:28	Moon enters the Earth's umbra.
04:30	Moon fully within Earth's umbra.
05:07	Midpoint of eclipse (sets over horizon)
05:54	Moon leaves the Earth's umbra.
06:55	Moon outside the Earth's umbra.
07:51	Moon leaves Earth's penumbra.

It will be difficult to see from Newbury because the Moon will set partway through the total eclipse and will only be 5° above the horizon when the eclipse starts. The total eclipse will last from 04:30 until 05:54. The Moon will be partially eclipsed between 03:28 and 06:55 (all times given in London time). The table opposite lists the times when each part of the eclipse will begin and end.

The eclipse will begin at 02:33, when the Moon first enters a region of the Earth's shadow called the penumbra. In this outer part of the Earth's shadow, an observer on the Moon would see the Earth partially obscuring the Sun's disk. As a result the Moon's brightness will begin to dim, as it is less strongly illuminated by the Sun but it remains illuminated. At 03:28, the edge of the Moon's disk will enter the Earth's umbra. This is the region of space in which an observer on the Moon's surface would see the Earth completely obscuring the whole of the Sun's disk and would find themselves thrust into night-like darkness.

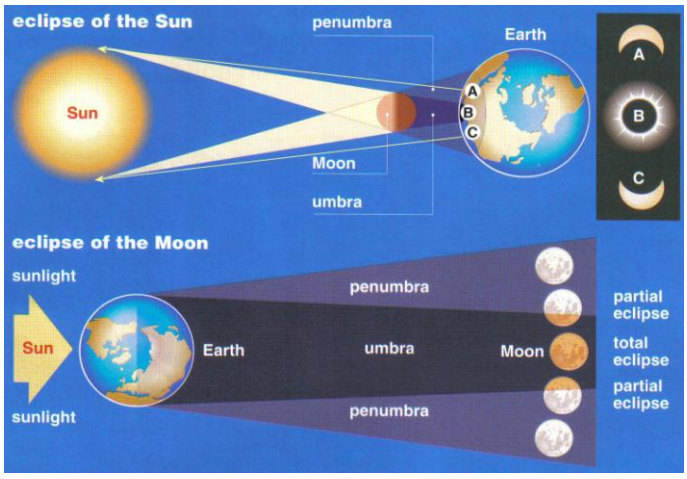


Diagram showing a Solar Eclipse and Lunar Eclipse

As an increasing fraction of the Moon's face creeps into the Earth's umbra, we will see our planet's circular shadow sweep across the face of the Moon. Eventually the Moon will pass entirely within the Earth's Umbra at 04:30 and the total eclipse will begin. Unfortunately for us the Moon will set at about 05:00.

A Lunar Eclipse occurs when the moon passes through the shadow cast by the Earth. This type of eclipse is more common than the Solar Eclipse simply because the shadow of Earth is larger than that of the Moon. As Earth orbits the Sun and our Moon orbits Earth, there are occasions when all three are aligned. A lunar eclipse will occur when Earth is between the Sun and Moon and the Moon passes through the Earth's shadow (see the left of the diagram below).

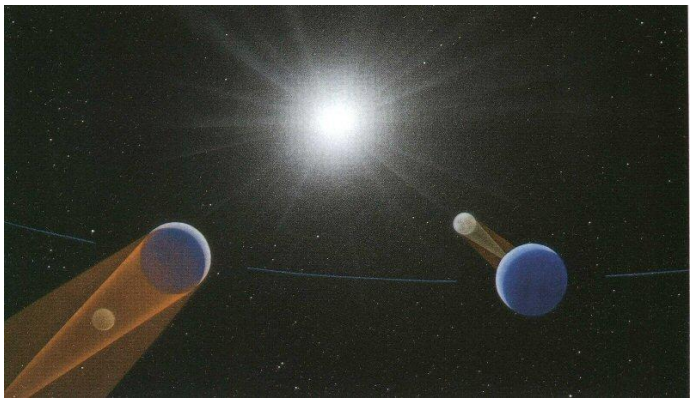


Diagram showing Lunar and Solar Eclipses

Lunar eclipses always occur at night, because the sunlight has to be shining on the opposite side of Earth (where it is daytime) to project the shadow on to the side of the Moon facing the night side of Earth. The Moon will also be full because it is in direct line with Earth but further out so looking from the dark side of Earth the bright side of the Moon will be seen fully illuminated by Sunlight.

As the Moon moves into the Earth's shadow, the shadow will be seen to start moving across the face of the Moon from the left side as viewed from Earth. The edge of shadow is not as sharp as in a solar eclipse because of Earth's atmosphere. It will creep across the Moon until the whole surface is covered. Not all Lunar Eclipses are 'total'.

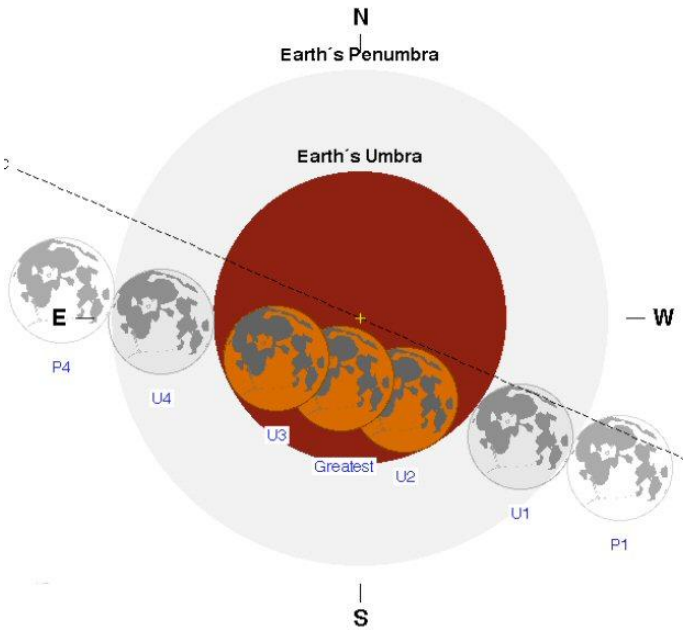
As Earth is much smaller than the Sun, it produces a shadow that is conical in shape as shown in the diagram above (left). When this shadow is projected on to an object it is called the 'Umbra' and from within the Umbra the Sun will be completely obscured. There is also a secondary shadow around the main conical shadow where the Sun is partially obscured this is known as the 'Penumbra'. When the Moon is within the Umbra it is in the full shadow but when it is in the fainter Penumbra the shadow will be difficult to see.

The surface of the Moon at totality is never completely dark and takes on a reddish glow that can vary between orange to deep red. This is caused by sunlight passing through the atmosphere around the edge of Earth and being refracted on to the surface of the Moon. The red constituent of the sunlight is bent more and is focused on to the Moon but most of the other wavelengths will miss the Moon. If there has been a recent volcanic eruption and there is a lot of smoke and ash in the atmosphere, the Moon will glow a in a deeper red.

From the surface of the Moon, the eclipse must be a glorious sight. The bright disc of the Sun will gradually be covered by the dark silhouette of Earth. Then at totality the Sun will be replaced by a very thin ring of red light and appearing quite large in the sky. This is sunlight shining through the thin layer of the atmosphere around the edge of the dark disk of the night side of Earth.

As the orbit of the Moon around Earth is tilted the Moon does not pass through Earth's shadow every month. It may pass above or below the main shadow (Umbra). If it only passes through the Penumbra the shadow will be almost indiscernible and will pass largely unnoticed.

The diagram below shows the path that the Moon will take as it passes through Earth's shadow. At position P1 the Moon starts to enter the Penumbra and a faint shadow will begin to cross the Moon. At position U1 the Moon enters the Umbra and the more obvious shadow will be seen on the left limb of the Moon. Between positions U2 and U3 the Moon will be completely inside the Umbra (Totality). At U4 it will have moved out of the Umbra and at P4 will have left the shadow altogether and the eclipse will be over.



The Total Lunar Eclipse will occur in the early morning of 16th May and will be visible from the UK.

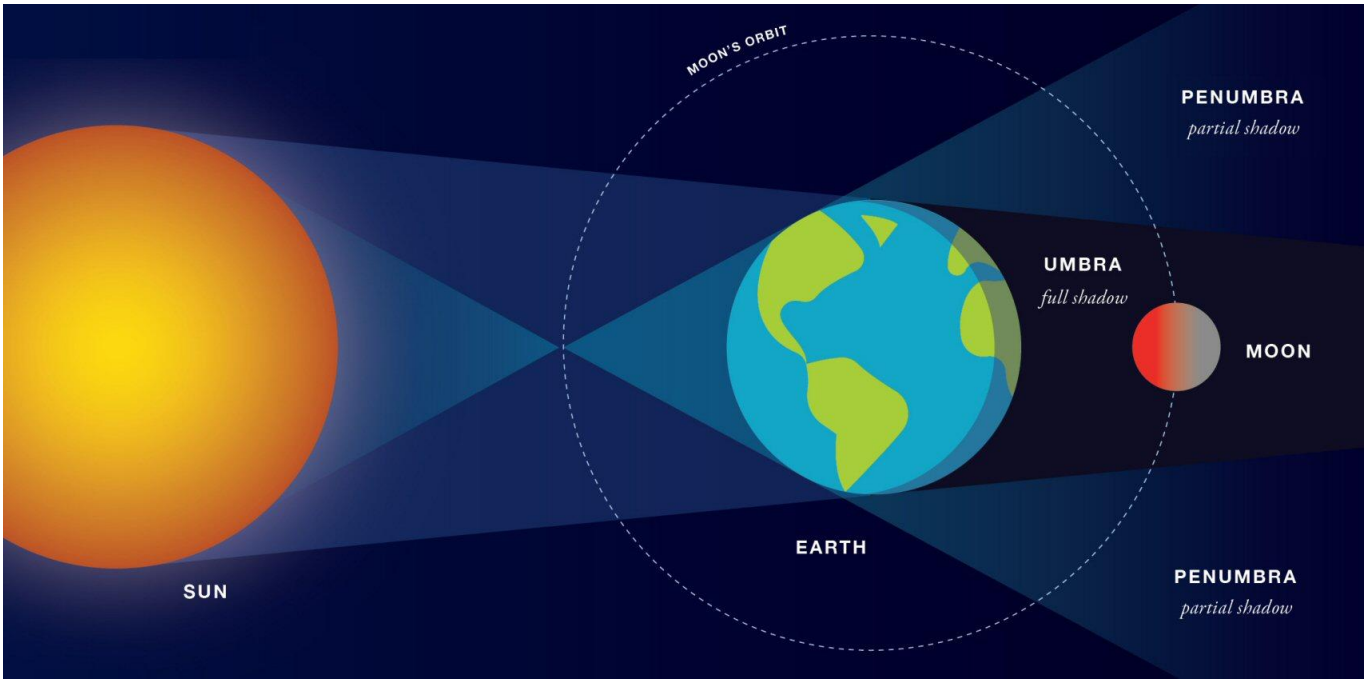
The times for the eclipse to be seen from Newbury are:

02:33	Enters the outer shadow (Penumbra)	P1
03:28	Enters the inner shadow (Umbra)	U1
04:30	Starts 'Totality'	U2
05:06	Greatest Totality	
05:00	Moon sets over western horizon	

Although the Lunar Eclipse will be over for us by 05:00 it will be seen in its entirety in the USA. However for those of us in the UK who have braved the early morning cold and missed out on a full night's sleep there could be an early morning treat while the eclipse is progressing. Most of the planets will be rising over the eastern horizon before the Sun rises.

While the Lunar Eclipse is developing on the western horizon the planets will be rising over the eastern horizon at: Saturn (03:30), Mars (04:00), Venus (04:30), Jupiter and Neptune (04:30). The eastern horizon will be starting to brighten but the brighter planets Venus, Jupiter should still be visible in the pre dawn sky.

TOTAL LUNAR ECLIPSE 16th MAY 2022



The Phases of a Lunar Eclipse

In the early morning of Monday 16th May there will be a Total Lunar Eclipse. These events go largely un-noticed by the general public, most of whom are probably not even aware that the Moon is eclipsed by the Earth's shadow.

At about 02:30 on Monday morning the Moon will enter the outer part of Earth's shadow known as the penumbra. The first phase, when the Moon moves through the penumbra, will hardly be noticeable. At about 03:30 the Moon will enter the Umbra, the inner and fully dark part of Earth's shadow. The curve of the edge of Earth will soon become apparent. As the shadow progresses across the Moon the comparative size of the Earth will be seen.

The Moon entering the Umbra on 28th September 2015

At about 04:30 the Moon will be completely inside the umbra of Earth's shadow and will remain completely inside the Umbra until 5:00. During this time the moon may almost disappear from view but this is not always the case; often an amazing effect can be seen.

All the light falling on the Moon from the Sun should be blocked by Earth but some does get past. The thin surface layer of our atmosphere acts rather like a lens and bends some sunlight around the curved surface of Earth and separates out the colours.

As the light is bent the colours are separated in the same way that a prism separates light into the spectrum. The red part of the sunlight is bent more and is able to illuminate the surface of the Moon. Most of the remaining colours of the sunlight are scattered and miss the Moon so the surface becomes bathed in red light.

So between 04:30 and 05:00 the Moon will be completely inside the central Umbra of Earth's shadow and will appear as an eerie orange globe hovering in the sky.

If we could view the Earth from the Moon at this time, the Sun would be completely blocked out by Earth. As the Moon moves out of the Umbra the Sun will appear as a smaller crescent peeping around the edge of Earth.

The totality on 28th September 2015 image Steve Harris

The effect can be quite spectacular as it was during the 2015 Total Lunar Eclipse shown above. The Moon appeared copper red and seemed to just hover in the clear cloudless evening sky. The effect does depend on the amount of dust and pollution in the atmosphere. Any recent volcanic eruptions can produce a stunning colour as in 2007. An early alarm setting and a clear view to the south west will be required to catch the whole event. It is also a spectacular event to capture for the keen photographer.

USING A CAMERA TO IMAGE THE MOON

There are three main ways to use a camera to take pictures of the Moon, these are:

1 Direct imaging and with the camera on a tripod.

2 With the camera fixed to a telescope mounting.

3 Taking pictures through a telescope.

The equipment described can also be used to image the Sun but with a Special Solar Fitted to the telescope.

There are three main problems with direct imaging: The objects to be imaged are not very bright, they are small (even the Moon is surprisingly small) and it is difficult to hold the camera steady for longer exposures.

We must use long exposures to capture sufficient light so it is best to mount the camera. Even if we select the 'night shot' function on the camera this will increase the exposure time so any movement of the camera will cause the image to be blurred. The simplest solution is to mount the camera on a tripod. A simple cheap tripod can be bought for as little as £15.

If a mobile phone is being used, some method of fixing it steady must be devised or purchased. This can be as simply as securing the phone to a steadying fixture using elastic bands. Various mounting devices can be purchased for mobile phones so it is worth checking astronomy and photographic websites and of course mobile phone centres.

Nearly all cameras have a standard mounting thread incorporated into the camera body so it can be easily fixed to a tripod. This is done by screwing the camera on to the thread and securing the camera to the thread using a lock nut. This is generally fitted to the thread. Some tripods have a fixing plate that is first secured to the camera then clamped to the head of the tripod.

A compact digital camera mounted on a tripod

A DSLR camera mounted on a tripod

The pictures above show how the two main types of camera (digital compact and DSLR) can be mounted to a simple tripod using a Mounting Pad.

These articles are not intended to be a lesson about how to operate a camera to take images of the night sky but we do need to consider the attributes and limitations of the camera to be used.

The modern mobile phone is often equipped with a very versatile and useful camera but it is not really designed for night sky imaging. They are supplied with many special functions such as a dark shot facility that can be used to take twilight images. However they are of limited use for astronomical imaging but they can be used on a tripod or attached to a telescope with a special mounting adaptor.

A multi-purpose mobile phone mounting adaptor

A Compact Digital Camera has similar attributes to the mobile phone but has a bigger and better lens and the camera generally has more built in functions. One distinct advantage it does have over the mobile phone is that it can be easily mounted on a tripod. This provides greater stability when taking a picture using a long exposure.

A DSLR (Digital Single Lens Reflex) camera is really the best camera for taking astronomical images for a number of very important reasons:

1 It is designed for mounting on a tripod.

2 Its lens assembly can be changed to suit the image.

3 It has a multitude of special functions.

4. It can be operated remotely to avoid movement.

A DSLR with a telephoto lens and remote button

All the cameras mentioned above produce digital images that can be downloaded to a computer. This has the advantage that the downloaded images can be processed on the computer to enhance and improve the image.

ATTACHING A CAMERA TO A TELESCOPE

There are three alternative ways to attach and use a camera with a telescope and its mounting. The first is to simply use the telescope to support and direct the camera to the object to be imaged. The image below shows a DSLR mounted 'piggy back' on a small refracting telescope. It does not matter that the camera is on its side the image can be rotated using a computer.

A DSLR 'piggy backed' on a telescope mount

The image above shows the DSLR secured to a screw thread on the telescope mount. This allows the camera to be pointed to the object in the sky using the main telescope and finder scope. The telescope mount can also provide tracking for longer exposure images.

A mobile phone or a compact digital camera can also be mounted to take pictures of an object as seen through the telescope eyepiece. This can be achieved (mainly when taking a picture of the Moon) by just holding the camera lens in front of the eyepiece and using the image on the camera screen to centralise it. Obviously this can be made a lot easier by mounting the camera (or mobile phone) over the eyepiece as shown below.

A compact camera mounted over a telescope eyepiece

Many good images have been taken particularly of the Moon using this method. However this process is rather limited but it can also be used with a mobile phone and a suitable mounting device. The fixture shown above has a mounting platform with a screw to fit the camera. It also has a screw adjuster to move the platform left and right, with a knob positioned to the right hand side of the platform. The extension arm below has an up and down adjustment and there is a locking knob to the front.

The more versatile DSLR camera has the advantage that it can be mounted on a telescope to use the telescope as its primary optical device (lens [or mirror]). This can be done by removing the camera lens and fitting an adaptor that will fit directly into the telescope focuser.

A DSLR with a focuser adapter fitted

The picture above shows a DSLR with the camera lens removed and a telescope focuser adaptor fitted. This is a very easy task, the camera has a lens release button that when pressed allows the lens to be twisted and released from the camera body. The adaptor is simply clicked in and twisted until it is engaged and clamped in position. The adaptor above is shown with an inferred / ultraviolet filter fitted to prevent these unwanted rays reaching the imaging chip to spoil the image.

The camera above also has a 'video out' outlet that allows the image that the camera is waiting to expose, to be displayed on a larger screen such as a TV monitor. This feature is a great improvement over trying to focus the image on the camera's small 'built in' screen.

All we need to do now is fit the camera to the telescope focuser and we are ready to start imaging.

A DSLR mounted for imaging with remote shutter button

The image above shows the DSLR fitted to the focuser of a 120mm Skywatcher refracting telescope. It also shows the remote shutter operating button that is a really good accessory to reduce vibration when shooting images. It is worth pointing out the camera strap is looped around the finder scope mounting. This is in case the pinch screws holding the camera should slip and drop the camera. Focusing the image is done using the telescope focuser knob.

SOME IMAGES OF THE MOON BY THE AUTHOR

The image above was taken using a DSLR camera mounted to the focuser in place of the eyepiece. The telescope used was the 120mm aperture 1000mm focal length refracting telescope shown on page 6. The exposure was 1/3000 second. The only processing was to change to grayscale with the contrast and brightness slightly enhanced using Paintshop.

The image above was taken a few days later using the same DSLR camera as above and telescope and slightly enhanced using Paintshop as above.

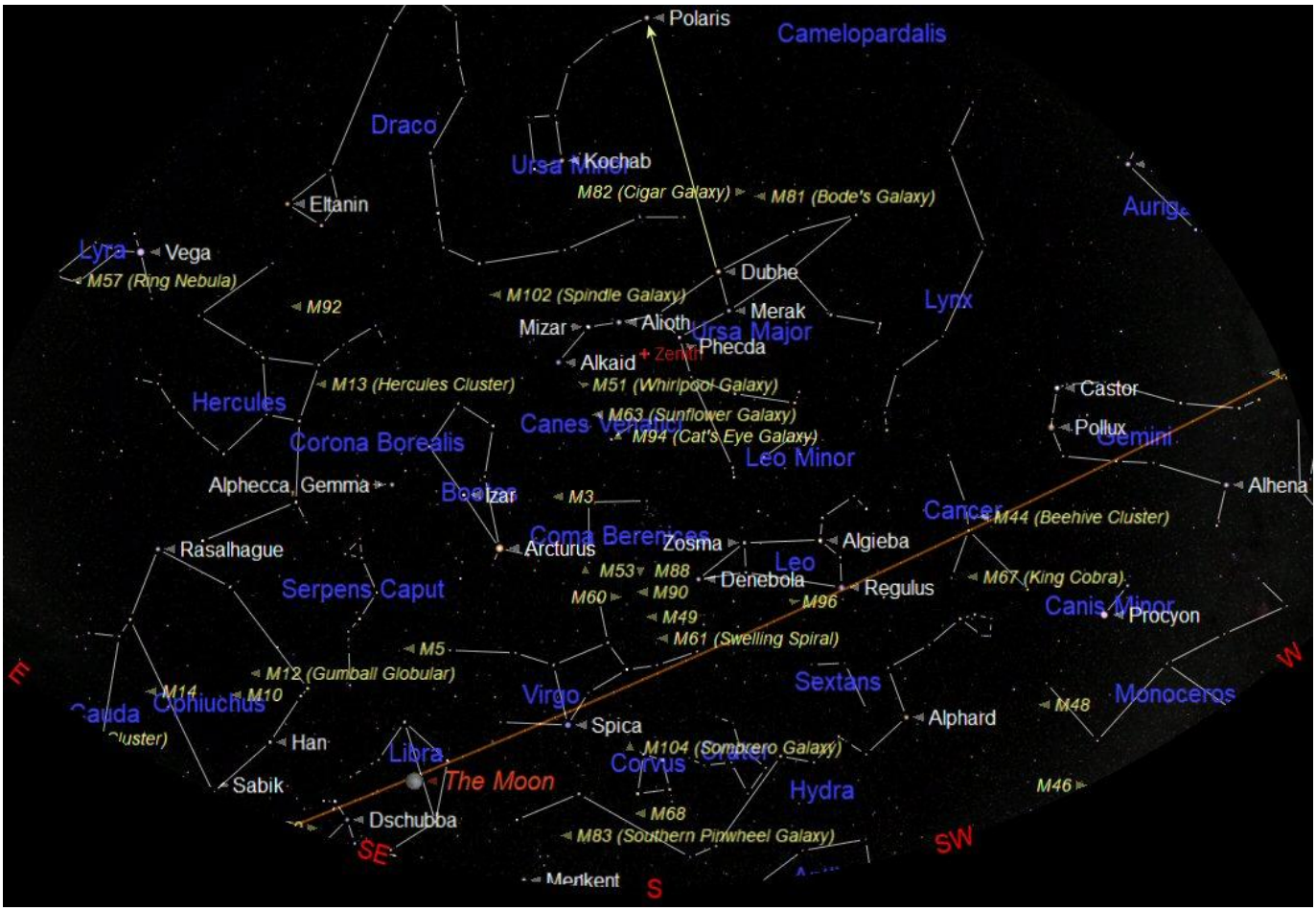
The image of the Full Moon above was taken a few days later using the same DSLR camera and telescope and slightly enhanced using Paintshop as above.

The image above was taken using the same DSLR camera mounted to the focuser in place of the eyepiece. The telescope used was a 300mm aperture 3000mm focal length Meade telescope. The exposure was 1/3000 second.

The image above was taken using a DSLR camera mounted to the focuser in place of the eyepiece using the same telescope as above.

The image above was created by combining the two images above to produce this image of the whole Moon as it appeared in the sky. The combining was done using Paintshop but with no enhancements.

A TOUR OF THE NIGHT SKY - MAY 2022



The chart above shows the night sky looking south at about 22:00 BST on 15th May. West is to the right and east to the left. The point in the sky directly overhead is known as the Zenith and is shown (in red) at the upper centre of the chart. The curved brown line across the sky at the bottom is the Ecliptic or Zodiac. This is the imaginary line along which the Sun, Moon and planets appear to move across the sky. The brightest stars often appear to form a group or recognisable pattern; we call these 'Constellations'.

Constellations through which the ecliptic passes this month are: Aries (the Ram), Taurus (the Bull), Gemini (the Twins), Cancer (the Crab), Leo (the Lion), Virgo (the Virgin) and Libra (the Scales) just coming into view.

The constellation of Gemini (the Twins) can be seen in the early evening in the west. The two brightest stars in Gemini are Castor and Pollux and they are named after mythological twins. To the north west of Gemini is the odd pentagon shape of Auriga (the Charioteer). Dominating Auriga is the brilliant white star Capella which was almost directly overhead but now moving to the west. For those with a telescope there is a line of lovely open clusters to search out in Taurus and Auriga. These are M35 in Taurus and M36, M37 and M38 in Auriga.

In the west the winter constellation of Orion (the Hunter) is disappearing over the horizon but one of Orion's Hunting Dogs Procyon (the little dog) can still be seen in the south west. So if a bright star is seen in the south west this will be Procyon Orion's Little Dog.

To the east (left) of Gemini is the rather indistinct constellation of Cancer (the Crab). The stars of Cancer are quite faint and can be difficult to discern especially in a light polluted sky. It is really worth searching out Cancer using binoculars or a telescope to see the Open Cluster M44 (the Beehive Cluster). M44 is older and further away than M45 (the Seven Sisters) so is fainter than M45 but still looks lovely. It has a group of stars that resemble an old traditional conical straw Beehive with bees around it.

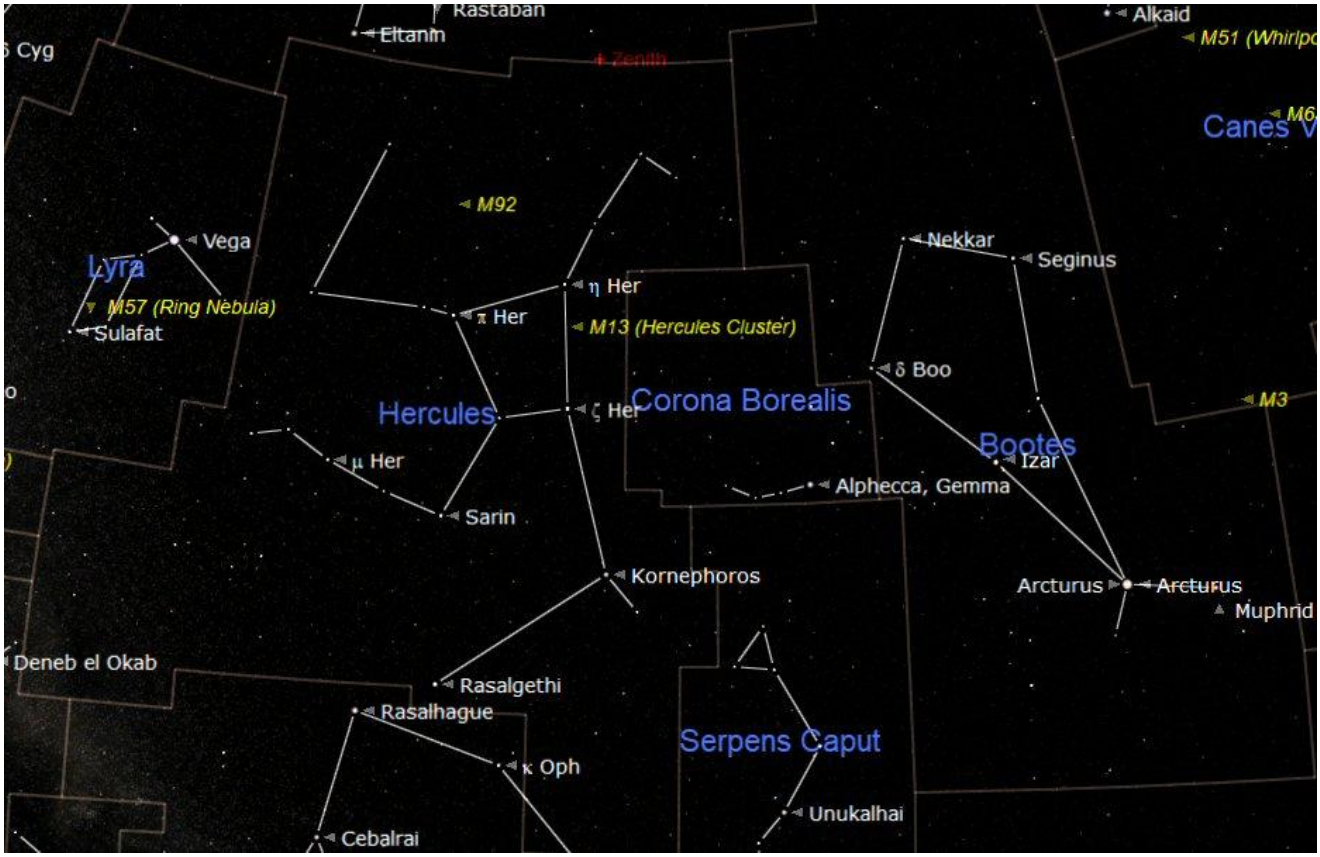
The constellation of Leo (the Lion) follows Cancer along the Ecliptic. It does actually look a little like a lion or the Sphinx in Egypt. Around and between Leo and the neighboring constellations of Coma Berenices and Virgo is a cluster of galaxies. Our galaxy and our local group of galaxies are members of this larger group of galaxies called the Virgo Cluster (see the April magazine). A medium sized telescope (150mm to 200mm) and a dark sky is required to see these faint objects.

The constellation of Virgo (the Virgin) can be seen at the lower east (left) of the chart above. To the north (above) and between Virgo and Leo is the fainter constellation of Coma Berenices (the hair of Berenices).

To the north of Virgo is the constellation of Boötes with its bright orange coloured star called Arctaurus. The other stars in Boötes are fainter and form the shape of an old fashioned diamond shaped kite with Arctaurus located where the string of the tail would be attached.

Arctaurus is one of just a few stars that do actually appear to be coloured. Arctaurus is noticeably orange to the 'naked eye' and even more so when using binoculars or a telescope. It is actually a star with a mass similar to our Sun but is older at 7 billion years (our Sun is 4.3 billion years old). Arctaurus is approaching the end of its life and has developed into a Red Giant.

THE CONSTELLATION OF HERCULES AND BOÖTES



The constellations of Hercules and Boötes

The chart above shows the constellation of Hercules and its location to the west (right) of the bright star Vega in the Summer Triangle. Hercules is the great strongman from Greek mythology. He is usually illustrated in the sky (usually up-side-down) as the strong man with a club held above his head. The 'Keystone' asterism (shape) can be a little difficult to identify in a light polluted sky but easy to find again.

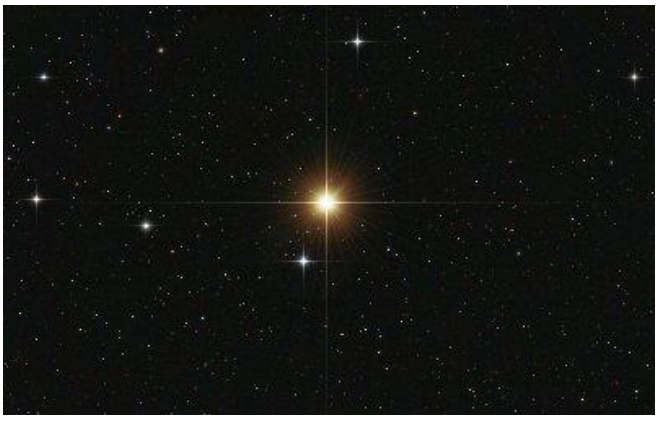
The jewel of Hercules is without doubt is the Great Globular Cluster, Messier 13 (M13). M13 can be found in the western (right) vertical imaginary line of the 'Keystone'. It is just visible using a good pair of 9 x 50 binoculars. The spherical cluster, of about a million stars, can be seen using a 90mm *f*10 telescope but will look even more impressive when using a larger telescope.

The Great Globular Cluster in Hercules

Globular clusters are thought to be the cores of small galaxies that have ventured too close to a Giant Spiral Galaxy like our Milky Way. The outer stars of these smaller galaxies have been stripped away, by the gravity of the giant spiral. This process has left the dense cores as clusters of between 100,000 and a million stars. There are about 100 Globular Clusters in a halo around our Milky Way. There is another Globular Cluster in Hercules called M92 but it is further away and needs a telescope to see.

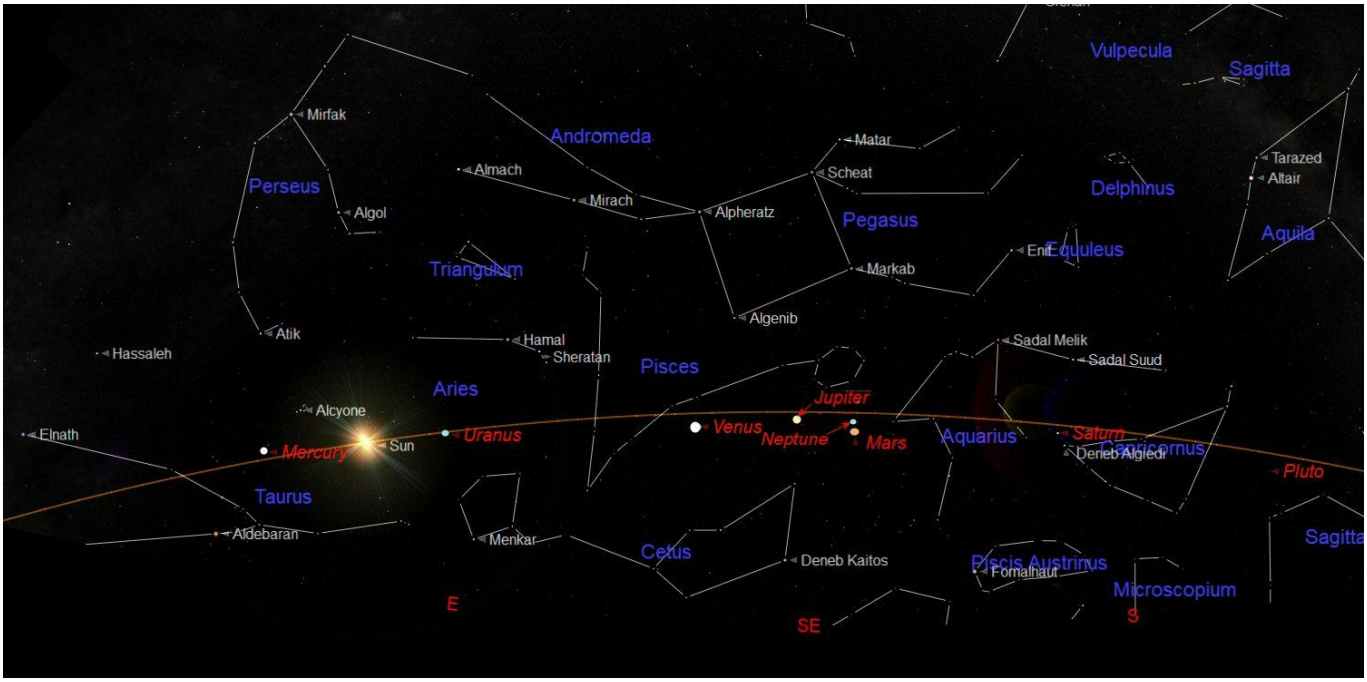
To the west of Hercules is the bright orange coloured star called Arctaurus in the constellation of Boötes the Herdsman. Arctaurus is the only bright star in Boötes, the other stars are fainter and form the shape of an old fashioned diamond shaped kite with Arctaurus located where the string of the tail would be attached.

Arctaurus is a Red Giant star that is slightly larger than our Sun but older 7 billion years. It has used almost all of its Hydrogen fuel and has expanded in diameter to around 25x that of our Sun. At the moment it shines 115 times brighter than our Sun but it is destined to collapse to become a White Dwarf and a Planetary Nebula.



The beautiful Red Giant Star Arctaurus in Boötes

THE SOLAR SYSTEM - MAY 2022



The location of the planets at 09:00 BST on 15th May 2022

The chart above shows the location of the planets along the Ecliptic in the morning sky. The sky has been darkened to make the planets visible. The planets are: (in order as they appear before sunrise) Saturn, Mars, Venus Neptune and Jupiter. They are visible along the Elliptic from the West (right) to East (left). Mercury and Uranus appear close to Sun after it sets over the western horizon in the evening. The planets appear low in the sky, in the bright morning or evening sky so are not well positioned for observing.

MERCURY will be moving into Inferior conjunction with the Sun on 22st May. After conjunction it will be moving into the morning sky and rising before the Sun. Mercury was at its greatest elongation on 29th April when it was at its apparent furthest point from the Sun.

VENUS rises about one hour before the Sun climbs over the eastern horizon. It is looking very bright in the east before sunrise. It will show a large diameter but it will be getting smaller and will appear as a widening crescent. It is called the 'Morning Star' at this time.

MARS is on the other side of the Sun (so appears very small) and still appears close to the Sun so will be difficult to see. Mars rises at about 03:30 about 90minutes before the Sun and will not appear in the evening sky again until September 2022.

JUPITER rises over the eastern horizon at about 03:30. It is bright and observable but is low over the eastern horizon before sunrise. The cloud markings will just be visible on its shimmering disc in the turbulent air.

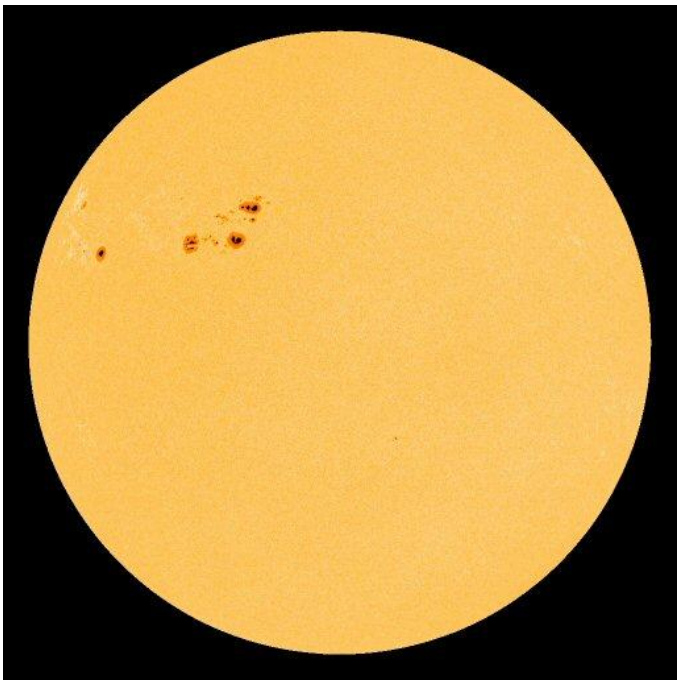
SATURN is the first planet to appear over the eastern horizon so will be appearing in the morning sky about 2½ hours before sunrise. It will be very low over the eastern horizon in the brightening sky and difficult to see but will be moving into the evening sky later in the year.

URANUS will not be observable this month as it will be in conjunction with the Sun on 5th May. It rises in the early morning sky just before the Sun.

NEPTUNE was in conjunction with the Sun on 13th March and has moved into the early morning sky. It is quite easy to find this month because it is located close to the much brighter Jupiter. It will still be difficult to see in the brightening dawn sky and will need a telescope to appear as a small blue disc.

THE SUN

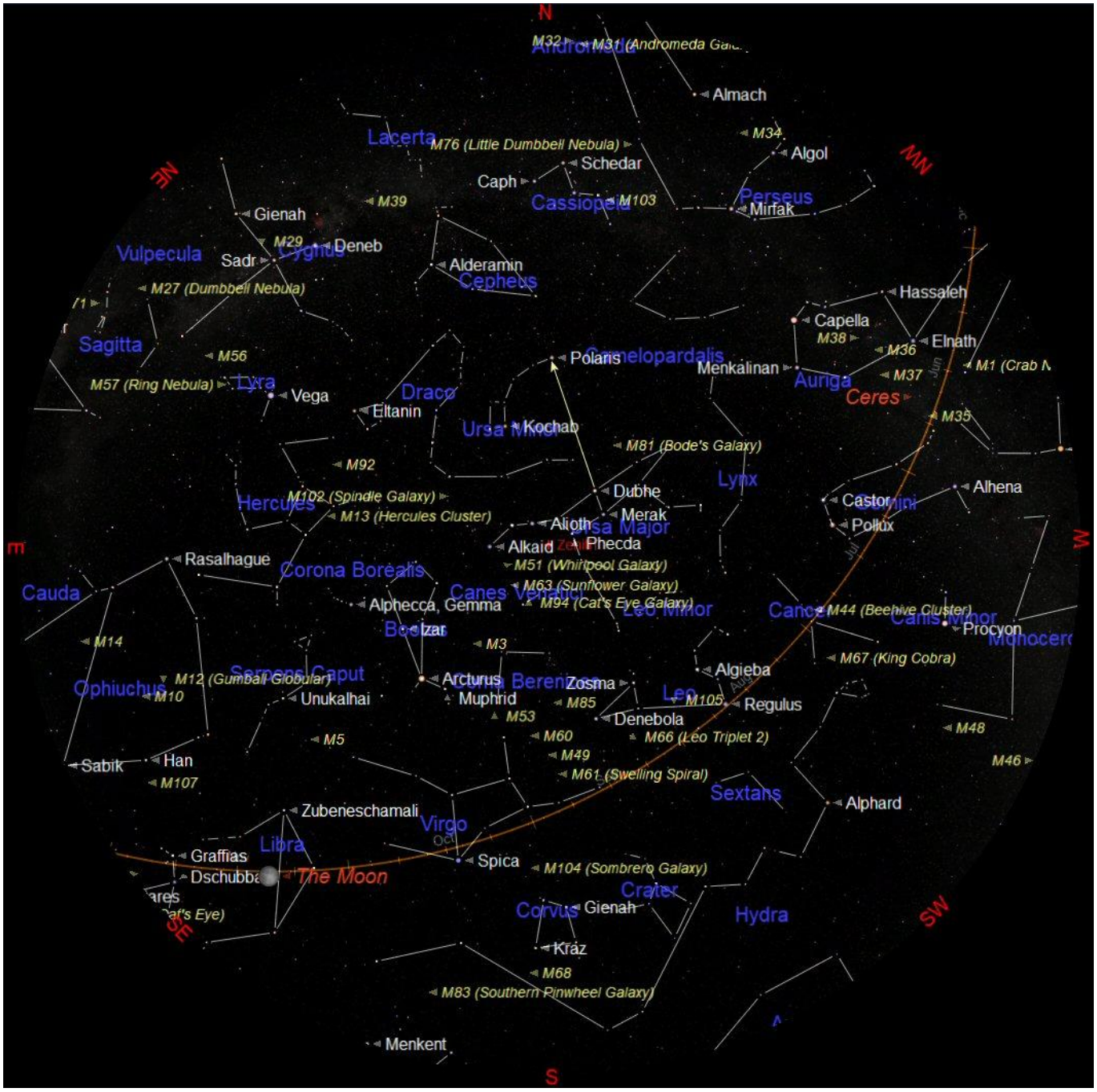
The Sun rises at about 05:30 BST at the beginning of the month and 05:00 by the end of the month. It sets at 20:35 at the beginning of the month and 18:00 at the end of the month.



Sunspots imaged by SOHO on 21st April

There have been a few nice Sunspots recently. Sunspots and other activity on the Sun can be followed live and day to day by visiting the SOHO website at: http://sohowww.nascom.nasa.gov/.

THE NIGHT SKY – MAY 2022



The chart above shows the whole night sky as it appears on 15th May at 21:00 (9 o'clock) British Summer Time (BST). As the Earth orbits the Sun and we look out into space each night the stars will appear to have moved across the sky by a small amount. Every month Earth moves one twelfth of its circuit around the Sun, this amounts to 30 degrees each month. There are about 30 days in each month so each night the stars appear to move about 1 degree. The sky will therefore appear the same as shown on the chart above at 8 o'clock BST at the beginning of the month and at 10 o'clock BST at the end of the month. The stars also appear to move 15º (360º divided by 24) each hour from east to west, due to the Earth rotating once every 24 hours.

The centre of the chart will be the position in the sky directly overhead, called the Zenith. First we need to find some familiar objects so we can get our bearings. The Pole Star **Polaris** can be easily found by first finding the familiar shape of the Great Bear 'Ursa Major' that is also sometimes called the Plough or even the Big Dipper by the Americans. Ursa Major is visible throughout the year from Britain and is always quite easy to find. This month it is located almost directly overhead. Look for the distinctive saucepan shape, four stars forming the bowl and three stars forming the handle. Follow an imaginary line, up from the two stars in the bowl furthest from the handle. These will point the way to Polaris which will be to the north of overhead at about 50º above the northern horizon. Polaris is the only moderately bright star in a fairly empty patch of sky. When you have found Polaris turn completely around and you will be facing south. To use this chart, position yourself looking south and hold the chart above your eyes.

Mercury and Uranus are visible in the early evening sky this month.