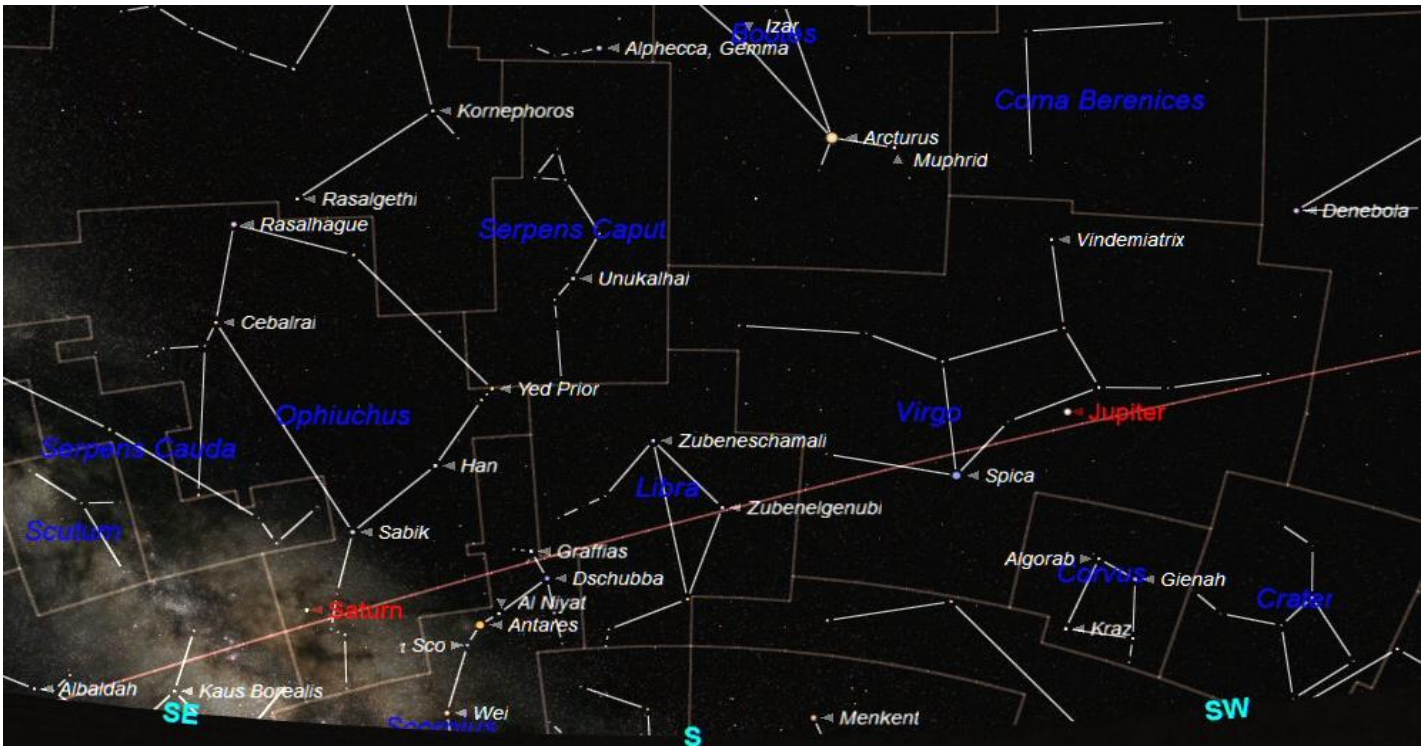
# NEWBURY ASTRONOMICAL SOCIETY

# MONTHLY MAGAZINE - JUNE 2017

## This will be the last magazine until September

## ASTRONOMY DURING THE SUMMER MONTHS




The night sky on midsummer day 21st June (the sky has been darkened by computer)

With the nights being short and the days being long during the summer months astronomers usually take a break from observing the night sky and possibly follow other 'summer' pursuits. However, for the determined astronomer there are still interesting astronomy related things look out for and other things that are loosely linked to astronomy.

Solar observing is one particular area where astronomical interest continues throughout the year and is particularly suited to the longer, brighter and warmer days of summer. Sun spots can be observed using very modest equipment. Remember the Sun must never be observed directly.

The Moon can also be observed throughout the summer and is bright enough to be seen during the day. The summer nights are good for just looking at the full Moon. The Ecliptic (the imaginary line along which the Sun, Moon and planets appear to move across the sky) is very low and close to the horizon during the summer nights. It is however high in the daytime sky as can be seen by the Sun being close to overhead in the middle of the day. When we see the full Moon rising over the eastern horizon during the summer evenings it looks particularly large. We call this the 'Harvest Moon'.

The brighter planets Venus, Jupiter and Saturn can also be observed during the summer although we will need to wait until very late in the evening before it is dark enough to see them. Venus will be observable in the morning sky but will need to be searched out in the very early morning at about 02:30 and before the Sun rises at about 03:45.

As the Sun is only just over the northern horizon during mid-summer the sky will never be completely dark even at midnight there will some brightness towards the north.

As astronomers spend a lot of time looking into the night sky they tend to spot satellites passing overhead that most people never notice. For those who take the time to look for satellites there is a surprisingly lot of them. In fact in a fairly dark sky there are usually 3 to 5 brighter satellites in view but in reality there are dozens up there in view at anytime one time if they are actively sought out. It is actually quite good fun to do a satellite spotting hunt with friends, it is not astronomy but it is good fun anyway.

During the month of June there is also the opportunity to see some very rare and beautiful cloud formations. These are known as Noctilucent Clouds (Night Clouds). They can only be seen at night and only in the weeks before and after midsummer day. Again this is not strictly an astronomical subject but astronomers are well placed to see these rare displays of nature.

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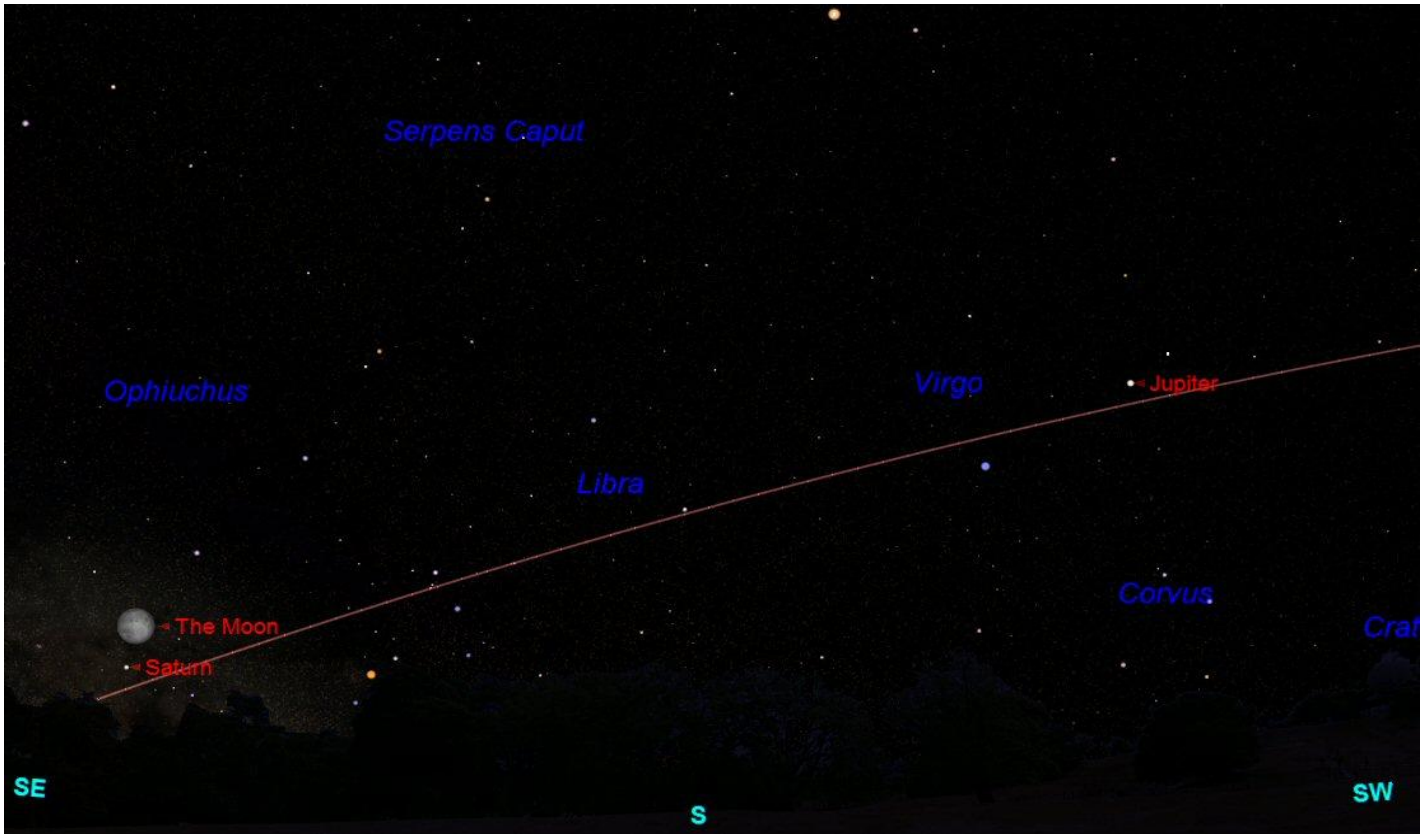
**NEWBURY ASTRONOMICAL SOCIETY MEETINGS**

8th September First Main Meeting
Website: www.newburyastro.org.uk

**NEXT NEWBURY BEGINNERS MEETING**

20th September First Beginners Meeting
Website: www.naasbeginners.co.uk

# THE MOON DURING THE SUMMER MONTHS

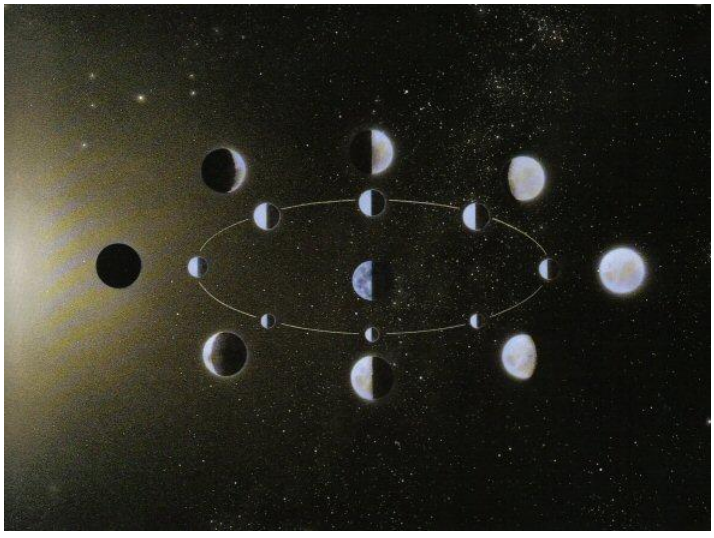



The Full Moon rising over the eastern horizon on 9th June at about 22:00

The Moon is so bright it can be seen in the sky even in daylight. It is always in the sky somewhere at sometime and will always be in the night sky for half of every month. Some features can be seen on the Moon with the naked eye but much more detail can be seen using binoculars. However a telescope is needed to see the finer detail. Even a small telescope will reveal craters, mountains and the maria (singular mare) also called seas. These darker areas were thought to resemble seas but are huge impact sites.

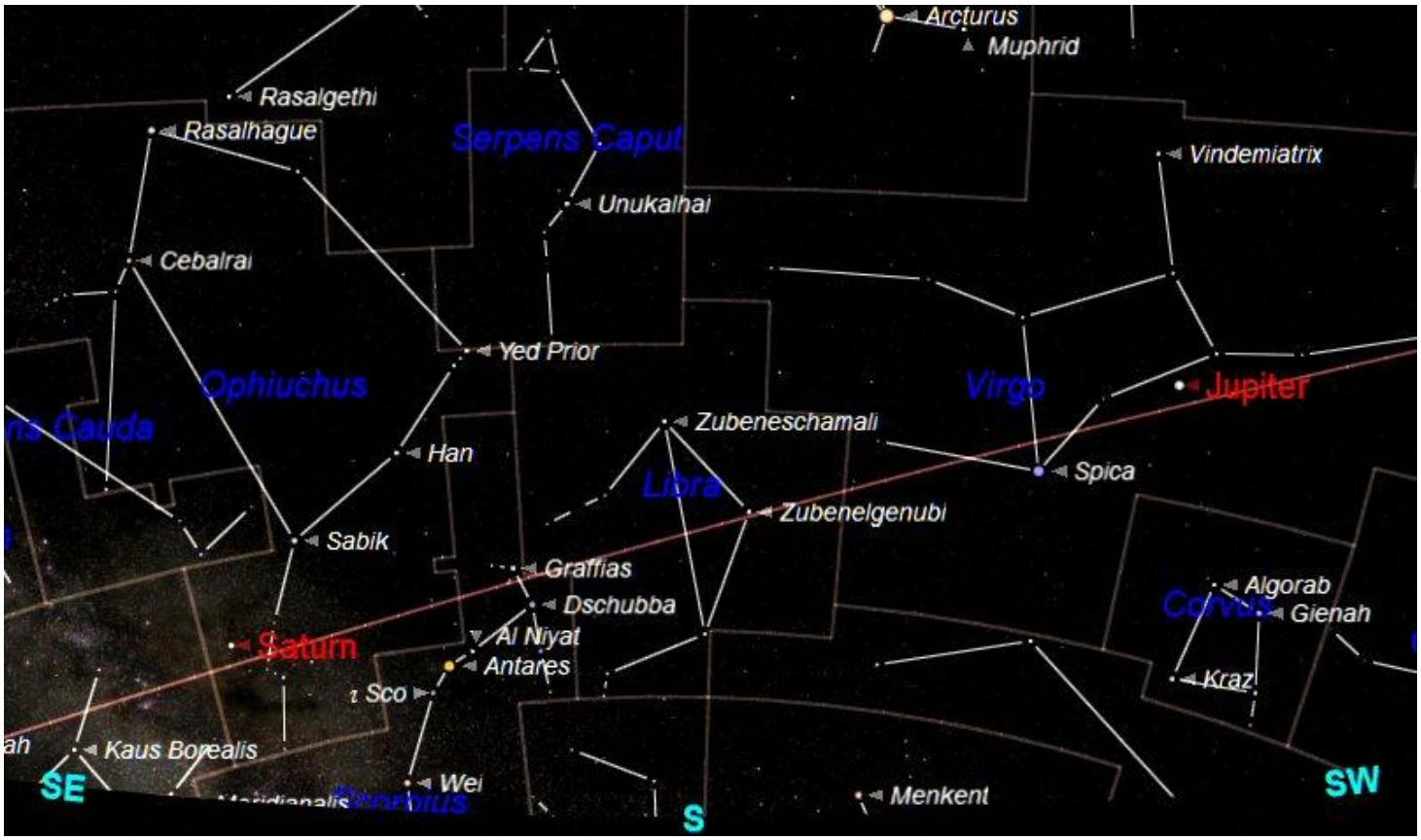
The Full Moon.

As the Moon orbits Earth about once a month the Sun illuminates different areas of the surface as we see it from our position on Earth. We call these different views 'Phases'. When the Moon is in the same direction as the Sun the side facing us is dark and we cannot see the Moon. As the Moon moves away from the Sun we see a thin slither of the illuminated side we call this phase 'New Moon'. A week later half of the Moon will appear to be illuminated we call this phase 'First Quarter'. When the Moon is on the opposite side of Earth to the Sun the whole of the Moon is illuminated so we call this phase 'Full Moon'. Three weeks after New Moon, half of the Moon appears to be illuminated we call this phase 'Third Quarter'. Here the opposite side of the Moon to the First Quarter is illuminated as the Moon moves back towards the Sun.



The Phases of the Moon

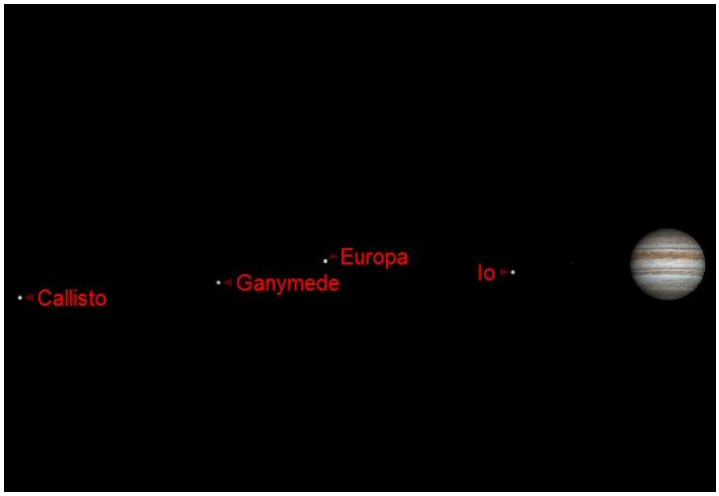
# JUPITER AND SATURN IN THE SUMMER




The locations of Jupiter and Saturn in the southern night sky

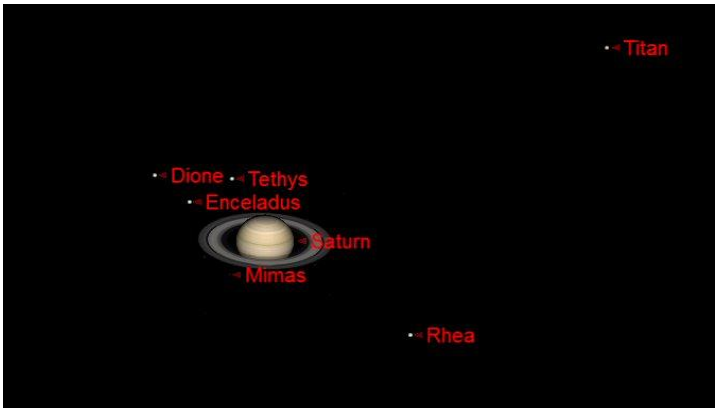
Jupiter has been in a perfect position for observing over the last few months and will still be around for the next three months. It rises over the eastern horizon in the early afternoon and is in the south west as the Sun sets. It is observable as soon as it is dark enough to locate and until it sets in the west at about 01:00.

The King of the Planets is located in the constellation of Virgo but is much brighter than any of the stars in its host constellation so is very easy to find. Except for the Moon it is by far the brightest object in the night sky. Its magnitude is -2.2 which is much brighter than the brightest star Sirius that has a magnitude of -1.4. Venus is brighter but it is a morning object at the moment rising just before the Sun. Jupiter's four brightest moons can be seen using binoculars. A modest telescope will show detail in the cloud bands and the Great Red Spot.




Jupiter with its four brightest moons on 22nd June

Saturn appears over the south eastern horizon at 20:30 in the beginning of this month and at 19:00 by the end of the month. It will be at its best and highest position above the horizon at around midnight. It will always be low and in the dirty turbulent air close the southern horizon.




A computer generated view of Saturn and its moons

A medium sized telescope will be required to see the ring system well and to be able to make out any of the features on the surface of the planet. Some of the moons will be visible in the telescope on a clear night. The largest moon Titan will be the easiest to see but up to 5 of the smaller moons may be visible depending on the telescope used and the prevailing condition of the sky.

Saturn is considerably more difficult to observe that Jupiter. This is because it is twice as far away from us and Saturn is and it is little smaller. Saturn receives only 25% of sunlight that Jupiter receives and we receive only 25% of reflected sunlight compared to Jupiter. It appears only half the size of Jupiter and because of the much reduced illumination Saturn appears only about 5% as bright as Jupiter.

# LOOKING FOR SATELLITES

Most people are completely unaware that satellites can be seen at any time when the sky is dark and clear. All that is needed is the time to take a look around the night sky. Amongst the background of 'fixed' stars we sometimes see one that appears to be moving across the sky, this may be a satellite. However we must be careful because there are many airliners high in the sky especially in the main air corridors like we have across Southern England. Luckily we can easily distinguish the planes because they have flashing lights but satellites do not. A pair of binoculars will greatly assist in distinguishing one from the other.

At any one time a keen observer may be able to pick out quite a number of satellites moving through different parts of the sky. They can be seen everywhere and moving in different directions but one type can be distinguished from the others. These are the Polar Orbiting Satellites that move in a north - south or south – north direction and are mainly Global Surveying types. Using this special orbit passing over the poles, Earth rotates under the orbit and allows the satellite to scan a different (north – south) strip on each orbit. Some of these satellites can survey the whole Earth each day. Satellite orbits vary greatly and depend on the original purpose of the satellite. Satellites are classified in a number of ways. Well-known (overlapping) classes include low Earth orbit, Polar orbit and Geostationary orbit (satellites that appear stationary in the sky).

In the context of spaceflight, a satellite is an object which has been placed into orbit by humans. Such objects are sometimes called artificial satellites to distinguish them from natural satellites such as the Moon. Satellites are used for a large number of purposes. Common types include military and civilian Earth observation satellites, communications satellites, navigation satellites, weather satellites, and research satellites. Space stations and human spacecraft in orbit are also satellites.

A long exposure image of the ISS

The easiest satellite to see is the International Space Station (ISS). It is by far the largest and brightest satellite in orbit. The ISS always moves from west to east but moves further south and north so is not always visible from the UK. A very good website to find out about the times and position where satellites will be visible is: www.heavens-above.com. By signing up to the site the observing location can be entered so the times and co-ordinates of any satellite that can be seen from your location can be detailed.

Although, strictly speaking, satellites are not astronomic objects they are interesting to see. Astronomers can't help but notice them as they look up into the night sky. One group of satellites provides a good trick at a summer party, these are the Iridium communication network satellites. They have a large shiny dish aerial which can reflect sunlight down to Earth. Heavens-above will give the exact time and place where the bright flash can be seen. This can impress people who don't know about it.

An image of an Iridium flare

Heavens-above will be able to give details of any Iridium flares that will be available from your location. It will give the exact 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 bright flash in the sky can be mysteriously predicted.

It can be fun to just sit out under a dark sky and look for satellites. 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.

All we need to do is look up into the sky and it does not matter which direction we look. 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.

An image of a satellite to the left of Orion

# NOCTILUCENT CLOUDS (night clouds)

An image of Noctilucent Clouds

Every year around mid-summer the Northern Hemisphere sky-watchers can catch a glimpse of the rare and very beautiful night clouds known as: Noctilucent Clouds. These mysterious, thin veils of clouds appear to form around Earth's polar regions in the mesosphere, the highest level of Earth's atmosphere. At these heights near the edge of space, around 80 kilometres up, temperatures are a bone-chilling minus 100°C and the air is a million times drier than any desert.

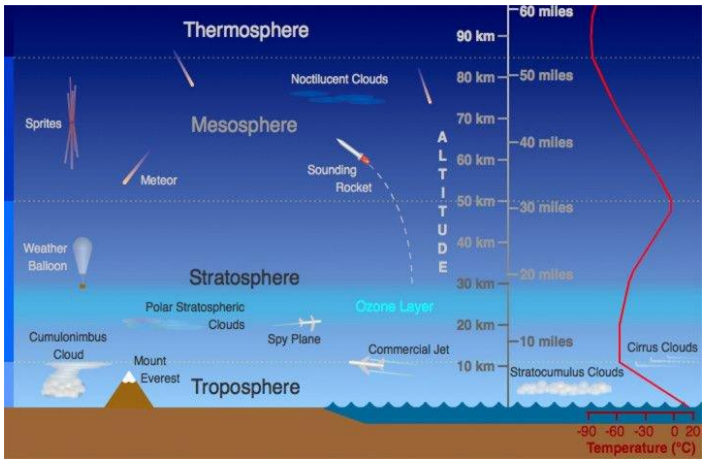



Diagram of Earth's atmosphere showing layers

Under these extreme conditions, water vapour freezes on to any dust particles floating in the region, seeding the ice crystals that form the tendrils and filaments of noctilucent clouds. Around dusk and dawn, the Sun is just over the northern horizon and brings the clouds to life, making them glow against twilight skies for observers further south. As the clouds are so high they can be seen from hundreds of kilometers away. They are in sunlight high above Earth and they can be seen glowing like Mother of Pearl from over the horizon where it is midnight and dark.

Noctilucent clouds were first recorded in 1885 after a volcanic eruption on the Indonesian island of Krakatau which sent a massive ash cloud into the upper atmosphere that circled Earth for months. Spectacular red sunsets and the distinctive glowing clouds persisted for years. While such large volcanic eruptions are not all that frequent, nearly a hundred tons of meteoritic dust falls on Earth every day and this meteor smoke largely seeds the formation of noctilucent clouds.

People living in latitude areas between 50º and 70º north have the best chance of seeing noctilucent clouds. Over the last century, the unusual sight has been reported more frequently. While it is a mystery why the clouds appear to be spreading, some scientists have suggested there is a link to climate change.

To catch sight of this beautiful seasonal phenomenon, look toward the north when the sun is below your horizon about an hour after local sunset. You can also look for them in the mornings in the north east about an hour before local sunrise.

In the image above the noctilucent clouds can be seen glowing in the sky above the northern horizon. Normal clouds are in the dark so are seen silhouetted against the bright sky above the local northern horizon. The noctilucent clouds are so high they are still in sunlight as the Sun is just 15° below the northern horizon as seen from southern England.

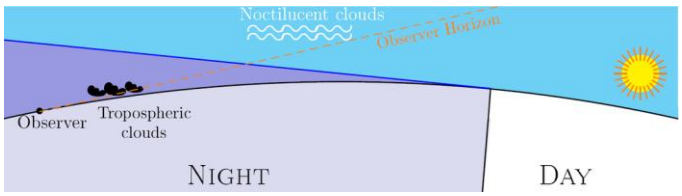
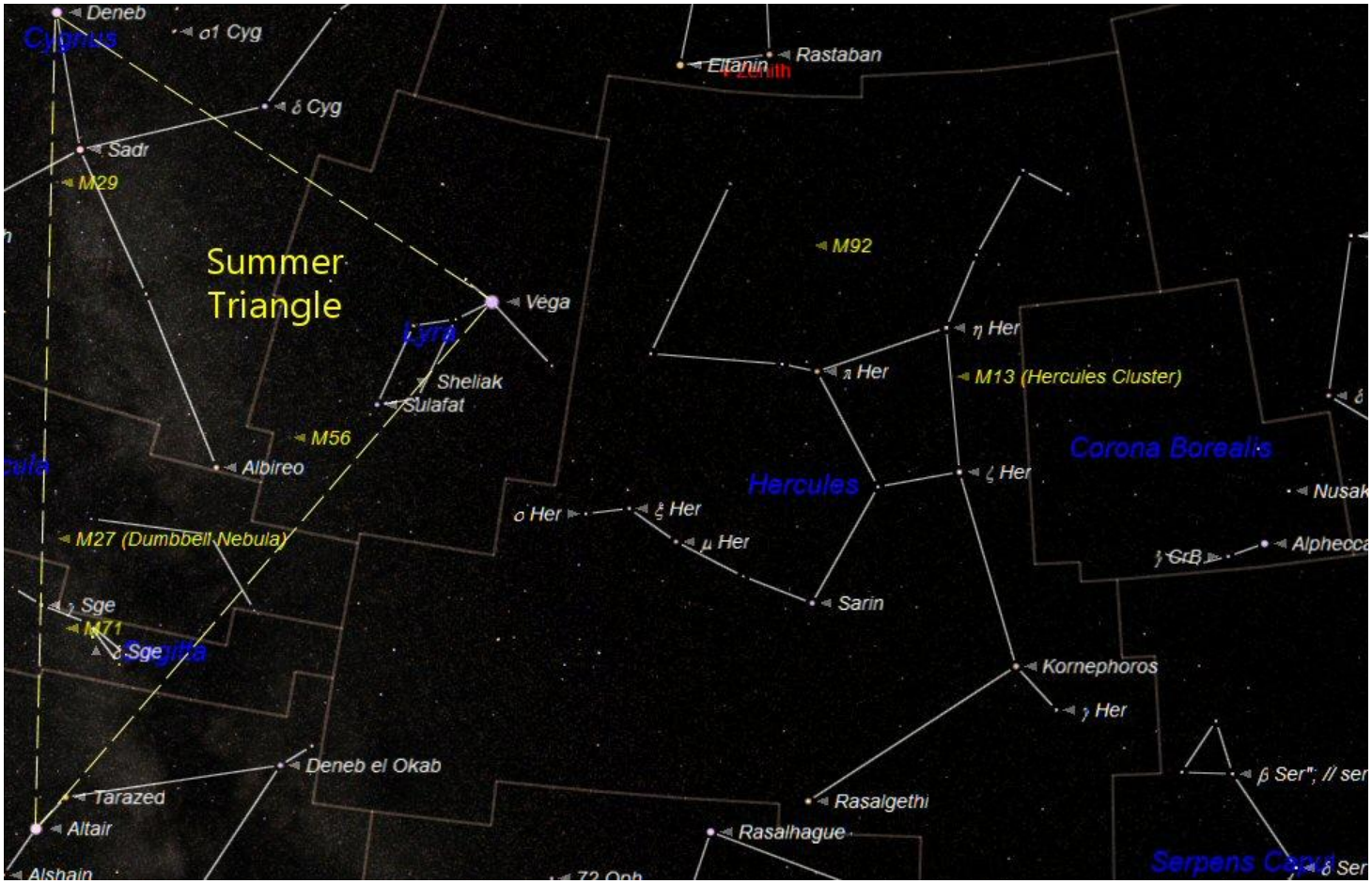



Diagram showing how the clouds are illuminated

# CONSTELLATION OF THE MONTH – HERCULES




The constellation of Hercules (and the Summer Triangle)

The chart above shows the constellation of Hercules and its location to the west of the Summer Triangle. The 'Keystone' asterism (shape) can be a little difficult to identify in a light polluted sky but easier to find again.

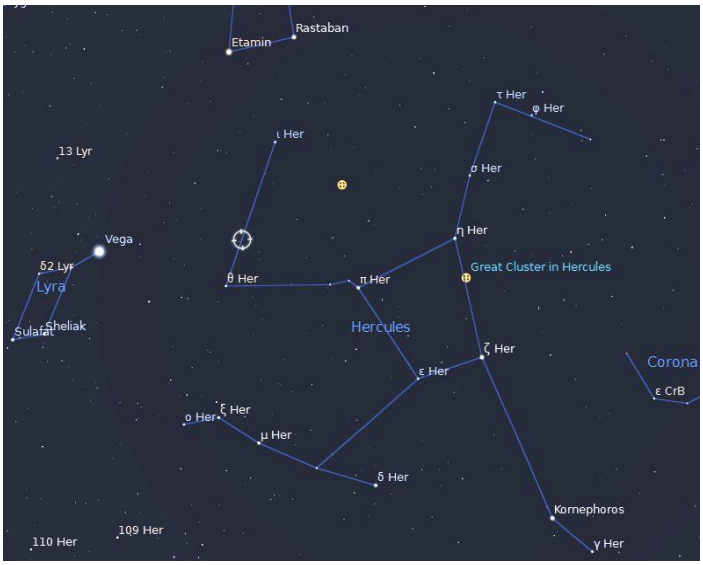
The jewel of Hercules is without doubt is the Great Globular Cluster, Messier 13 (M13). M13 can be found in the western vertical imaginary line of the 'Keystone'. It is just visible using a good pair of 9 x 50 binoculars. The cluster of about a million stars can be seen using a 90mm *f*10 telescope but will look very 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 our Giant Spiral Galaxy (the Milky Way).

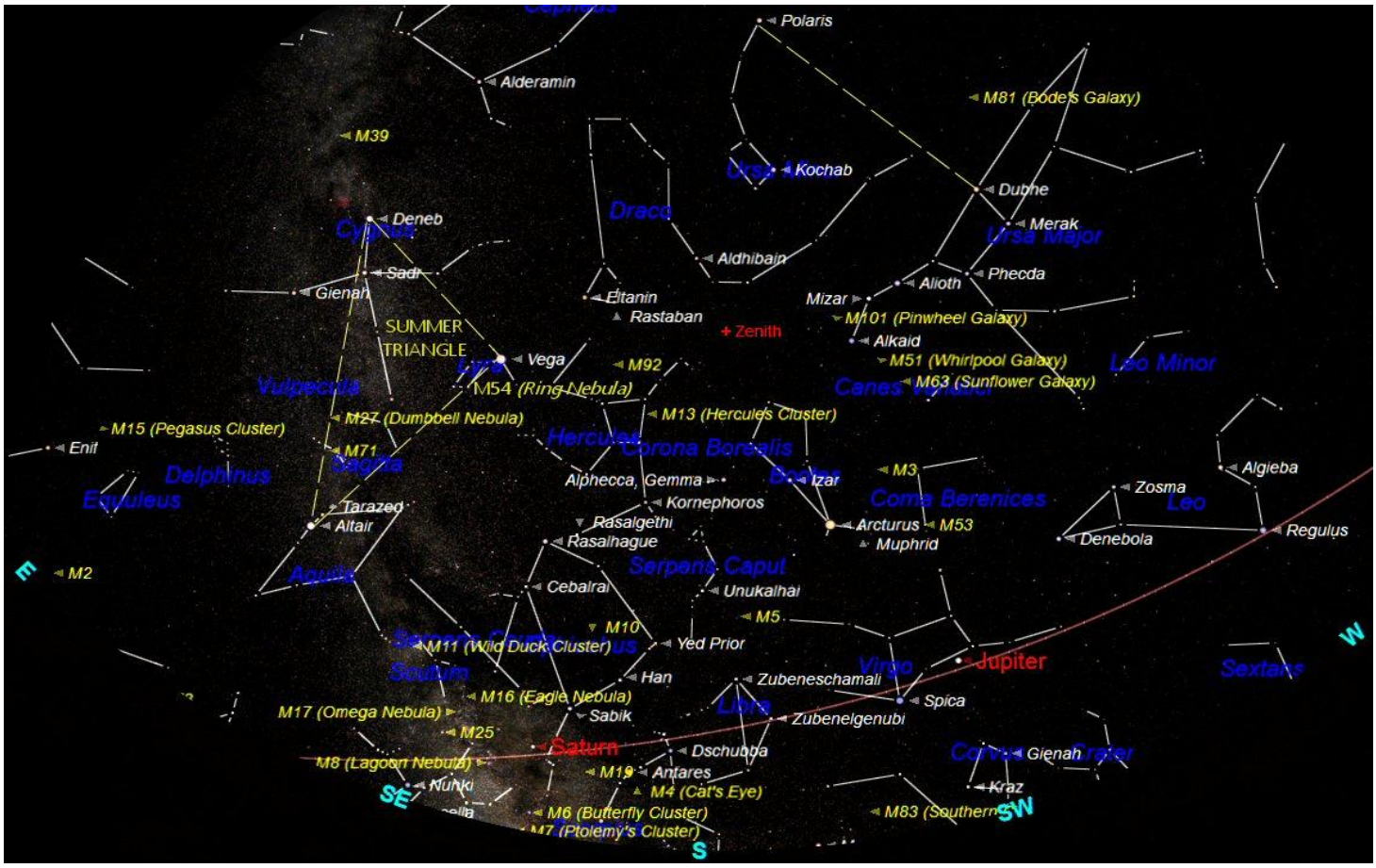
Like most stars, our Sun is believed to have been part of an open cluster, for at least the first hundred million years following its formation, approximately 4.3 billion years ago. In the time since its formation, the solar cluster has had ample time to dissipate. The members of the cluster will have gravitationally unbound themselves during their own long journeys around the centre of the Milky Way galaxy.

A star known as HD 162826 in the constellation of Hercules, 110 light-years away has been found to have an identical light spectrum to our Sun. This makes it very likely that it was formed in the same cluster as our Sun (Sun's sister).




The position of HD 162826 in constellation of Hercules.

# THE NIGHT SKY - JUNE 2017




The Southern Night Sky during June 2017 at 22:00 BST (10:00 pm)

The chart above shows the night sky looking south at about 22:00 BST on 15th June. 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 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 constellations through which the ecliptic passes are known as the constellations of the 'Zodiac'.

Constellations through which the ecliptic passes this month are: Gemini (the Twins) but low in the north west, Cancer (the Crab) to the west of Leo, Leo (the Lion), Virgo (the Virgin), Libra (the Scales), Scorpius (the scorpion) and Sagittarius (the Archer) both just appearing over the south eastern horizon.

The Milky Way (our Galaxy) appears to rise up through Sagittarius on the south eastern horizon. It continues up through the constellations of Aquarius and Cygnus then off the top left of the chart.

Gemini is off the west the chart and disappearing over the western horizon. Leo (the Lion) is on the right of the chart with is distinctive 'hook' shaped asterism looking like a sickle or a back to front question mark (?). The pattern that the brightest stars trace out is the very obvious shape of a resting lion or the Sphinx in Egypt. It is thought the Sphinx was carved into the shape of the lion from a similar looking natural rock formation in ancient times to represent the star formation of the lion, in the sky, on Earth. The original lion's head was replaced by the pharaoh's head we see today later during the reign of Pharaoh Khafre around 2558 to 2532 BC.

To the east (left) of Leo along the ecliptic is the constellation of Virgo (the Virgin). The constellation shape is comprised of mainly fairly faint stars except Spica which is easy to find. Jupiter is located in Virgo just above Spica so the bright planet can be used to locate Virgo. The constellation of Virgo is the Constellation of the month last month. Following Virgo and just above southern horizon is the rather indistinct constellation of Libra (the Scales).

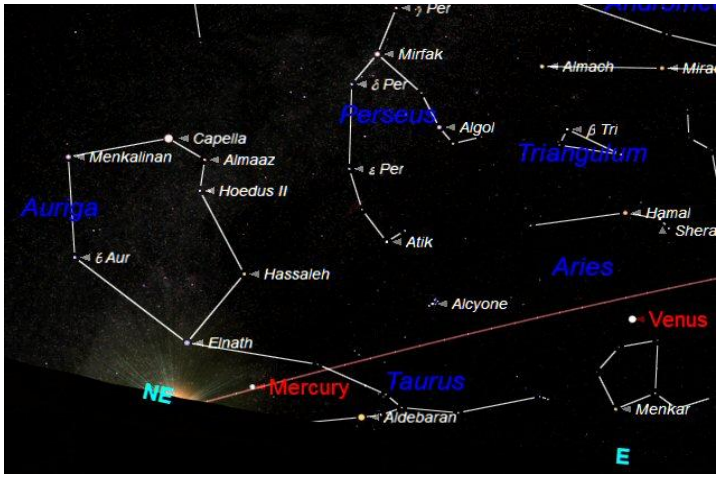
Above and to the east of Virgo is the spring constellation of Boötes conspicuously identified by the bright red star Arcturus. The star pattern of Boötes looks like a traditional kite with Arcturus at the bottom where the tail would be attached. To the east of Boötes is the constellation Hercules, named after the hero from Greek mythology.

To the east of Hercules is the famous 'Summer Triangle' with the bright stars Deneb, Vega and Altar at the corners of the imaginary triangle. The name of this distinct summer sky feature was suggested by the late and great Sir Patrick Moore. The Summer Triangle is easy to find and a great place to start exploring the night sky. The most northerly star Deneb is bright and will be almost directly overhead later in the summer. Deneb is the brightest star in the constellation of Cygnus (the Swan). To the south west of Deneb is the even brighter star Vega in the small but interesting constellation of Lyra (the Lyre – *small harp*). Altar the only bright star in the constellation of Aquila (the Eagle) has a fainter star to either side.

Almost overhead this month is the best known of all the constellations Ursa Major (the Great Bear) also known as the Plough or the Big Dipper to the Americans.

# THE SOLAR SYSTEM - JUNE 2017

**MERCURY** will not be visible this month as it is too close to the Sun in the early morning sky.




Mercury and Venus in the early morning sky

**VENUS** is now making its appearance in the early morning sky before sunrise in the east at about 02:00. It will appear very bright and sparkling in the turbulent air close to the horizon. The sky in the computer generated chart above has been darkened to show Mercury and Venus.

**MARS** will be lost in the bright sky in the west as the Sun is setting and will not be visible.

**JUPITER** is now just past its best for observing and moving towards the eastern horizon. It will be observable in the south east as soon as it is dark and still looks magnificent when viewed using a telescope. See the charts on pages 3 and 7. It will set over the western horizon at about 02:00 in the beginning of the month and around midnight at the end of the month. A good pair of binoculars will reveal the four brightest of Jupiter's moons, Io, Europa, Ganymede and Callisto.

**SATURN** will be visible in the brightening dawn sky close to the south eastern horizon. The ringed planet rises at about 20:30 at the beginning of this month and by 19:00 at the end of the month. The ring will appear wide open and easy to see however the view of Saturn will not be very good as it is quite close to the horizon and in turbulent, dirty air. A medium sized telescope (100 to 150mm aperture and 150x magnification) will be required to see the rings well. See page 3.

A computer generated view of Saturn and its moons

**URANUS** will still be too close to the Sun to be seen.

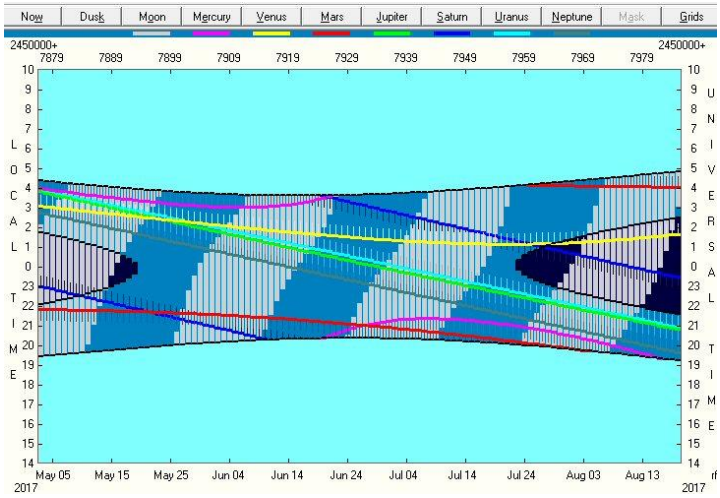
**NEPTUNE** will be very difficult to see.

## THE SUN

The Sun rises at 03:40 at the beginning of the month and at 03:45 by the end of the month. It will be setting at 20:13 in the beginning and 20:25 at the end of the month. The Summer Solstice (midsummer / longest day) will be on 21st June and will also be the shortest night of the year.

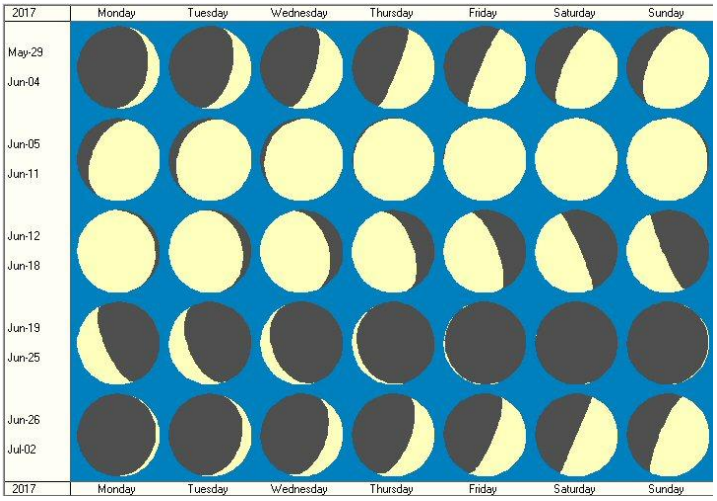
The chart below has been generated using Richard Fleet's brilliant 'Graphdark' application. It shows graphically the availability of the solar system objects for observing. The band across the centre is the night time viewing window and the light blue area is daylight. The vertical lines on the night band are days through the period shown on the scale along the bottom. The side scales show the time with '0' at midnight, reading up to 10:00 and down to 14:00.

The coloured lines show when the planets can be seen and the white / blue / black bands represent the presence of the Moon. [White] Moon in the sky, [Black] moonless night and [Blue] no Moon but the summer sky is not completely dark because the Sun is only just over the northern horizon.




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 MOON PHASES IN JUNE



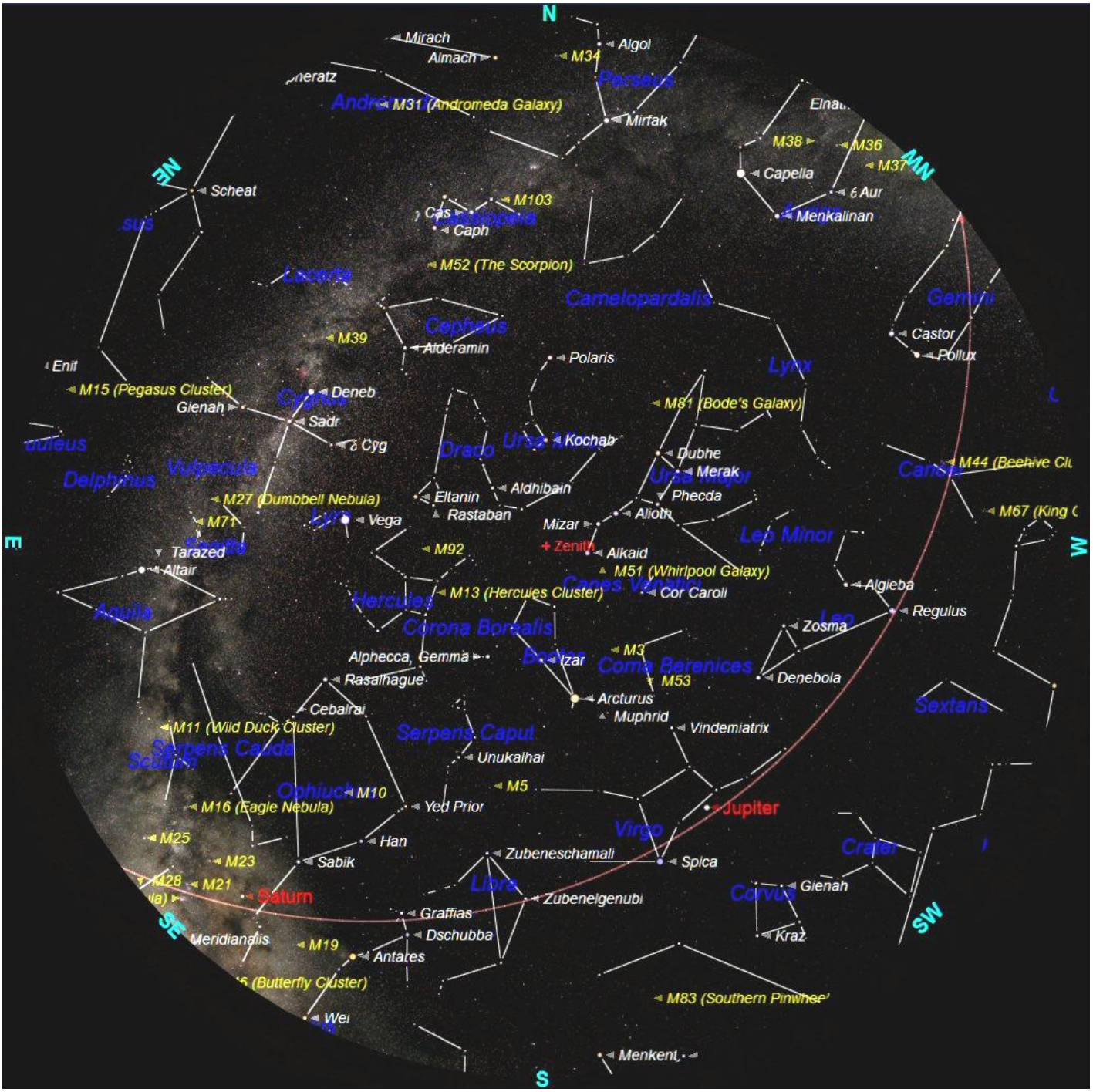

First Quarter will be on 1st June

Full Moon will be on 9th June

Last Quarter will be on 17th June

New Moon will be on 24th June

# THE NIGHT SKY THIS MONTH



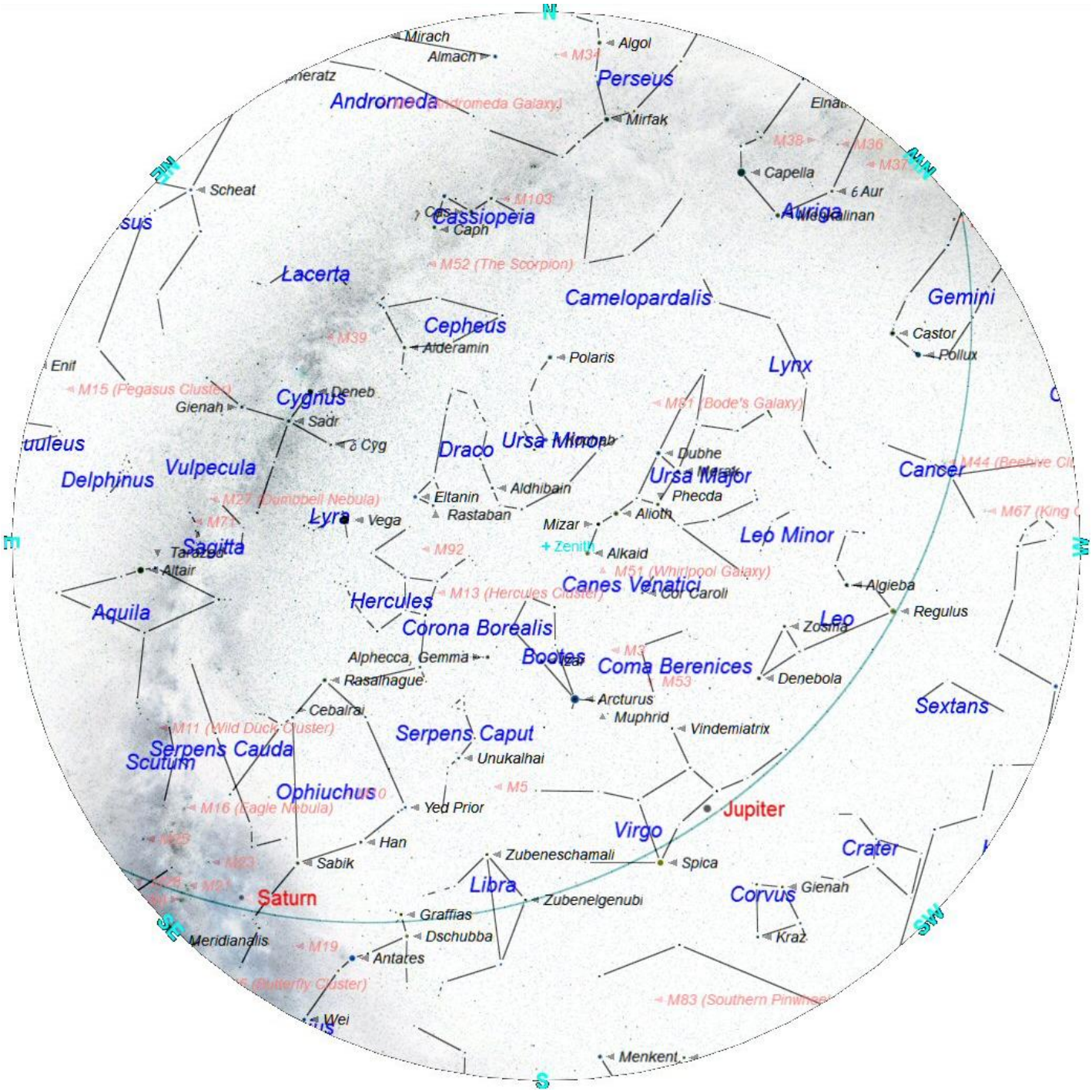

The chart above shows the whole night sky as it appears on 15th June at 22:00 (10 o'clock) in the evening British Summer Time (BST). As the Earth orbits the Sun and we look out into space each night the stars will appear to have moved across the sky by a small amount. Every month Earth moves one twelfth 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 11 o'clock BST at the beginning of the month and at 9 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 sky appears to rotate from east to west around the Pole Star (Polaris).

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 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.

Planets observable in the evening sky: Jupiter and Saturn. Venus is visible in the morning before dawn.

# THE NIGHT SKY THIS MONTH

This chart below is included for printing off and use outdoors




Position yourself looking south and hold the chart above your eyes with south at the bottom.

The chart shows the sky at 22:00 on 15th June 2017