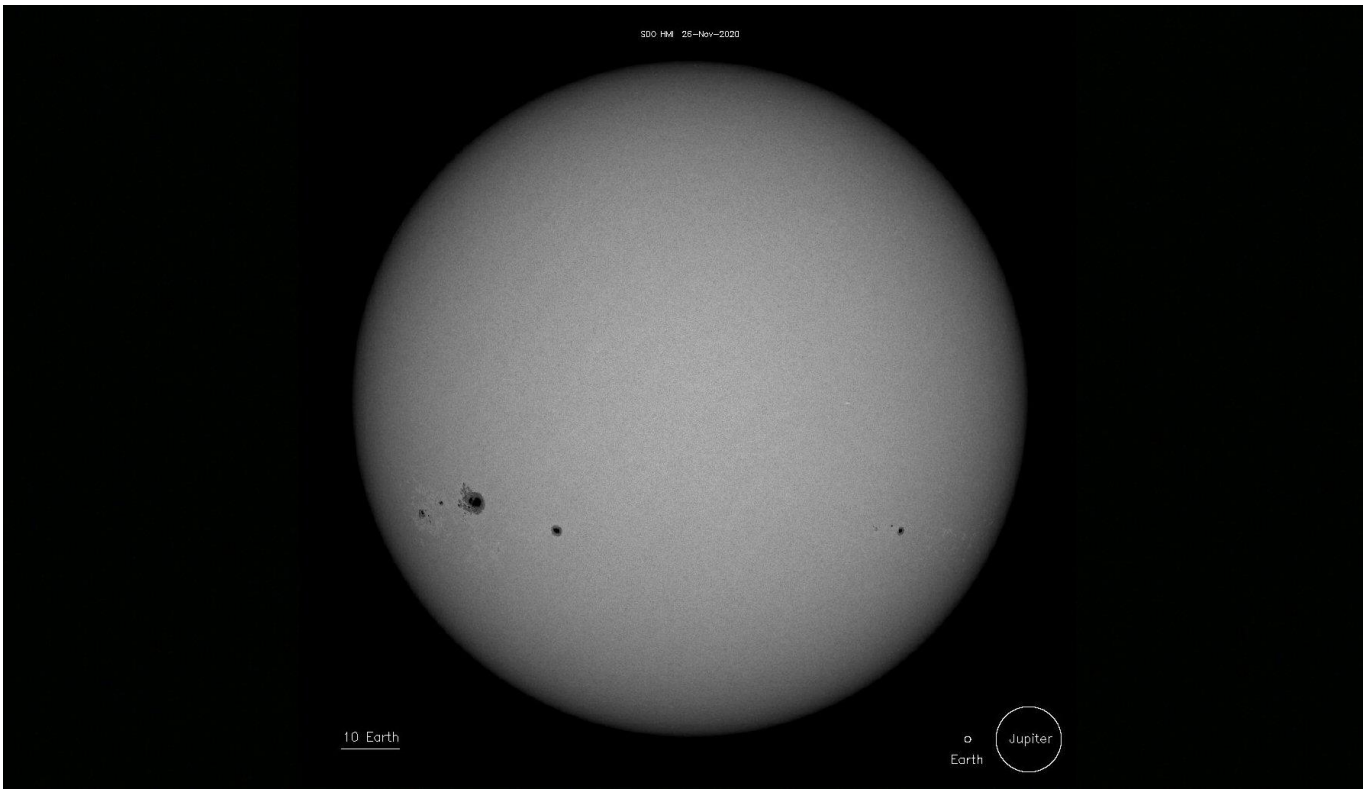
NEWBURY ASTRONOMICAL SOCIETY
MONTHLY MAGAZINE – DECEMBER 2020

SOLAR CYCLE 25 HAS BEGUN



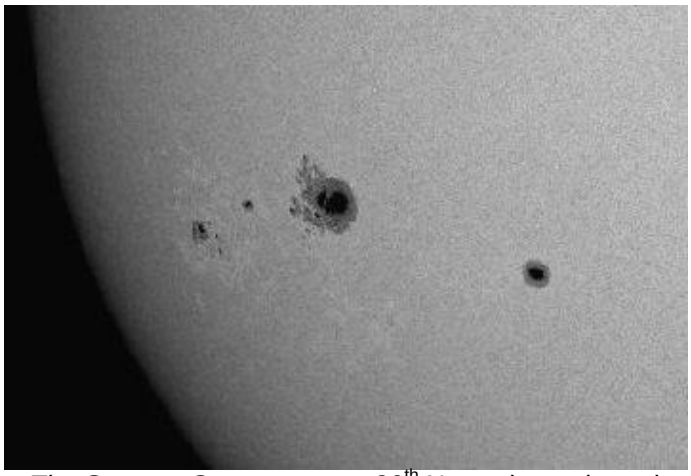
A NASA SOHO image taken on 26th November 2020

After months of very little or no activity on the Sun a number of sunspots and sunspot groups have confirmed the beginning of the 'build up' stage of the next Solar Maximum that will be known as Solar Cycle 25.

Solar Cycle 24 had its maximum peak of activity during the summer of 2014 and the cycle was declared to be over in December 2019. The official beginning of Solar Cycle 25 has been agreed by scientists who have been closely monitoring the Sun. One of the signs is the positioning of solar magnetic activity on and below the visible surface of the Sun. This magnetic activity moves away from the equator and closer to the poles then back again over the course of a Solar Cycle, about 11 years.

The Sun is a giant magnet with a magnetic North Pole and South Pole just like a bar magnet. Lines of magnetic force between north and south link the poles as all magnets do. The Sun is made of gas and is fluid so its structure is able to flow around freely. This allows the equatorial region to rotate faster than the regions near the poles. Consequently the equatorial region pulls the lines of magnetic force around with it. Over a period of about five years the lines of force become distorted and pulled around the equator until they become tangled.

Eventually the stress becomes too great and the lines of magnetic force begin to snap. They often reconnect to other force lines when a north force is attracted to south force. This snapping and rejoining can cause enormous discharges of stored energy. These can cause huge eruptions on and above the surface of the Sun.



The Sunspot Group seen on 26th November enlarged

Sun spots are caused by the magnetism of the Sun and often appear in pairs. In pairs one generally has North polarity and the other has South polarity. This produces gigantic arcs of magnetic force to form between the two sunspots.

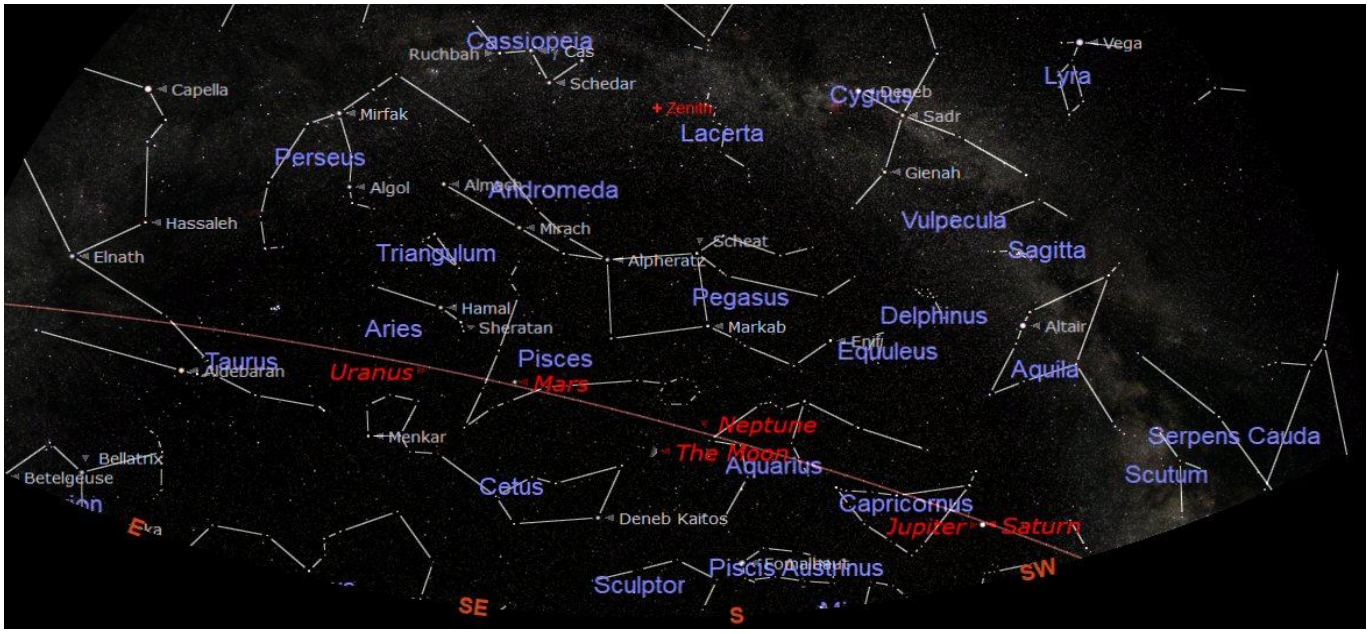
NEWBURY ASTRONOMICAL SOCIETY MEETING

11th December The Remarkable Recurrent Nova
Website: **www.newburyastro.org.uk**

NEXT NEWBURY BEGINNERS MEETING

16th December The Winter Solstice
Website: **www.naasbeginners.co.uk**

THE JUPITER AND SATURN CLOSE CONJUNCTION

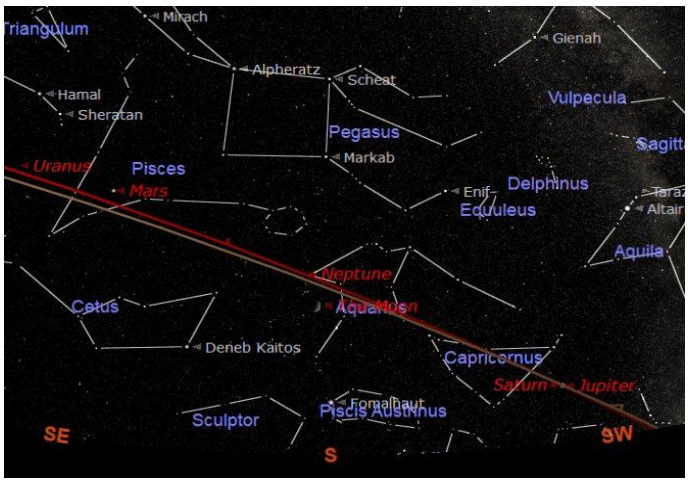


Jupiter and Saturn at closest conjunction 21st December 2020

The chart above shows the positions of Jupiter and Saturn this month low in the west in the early night sky after sunset this month. Jupiter and Saturn are moving closer together in the Conjunction (close together in the sky). They will be at their closest on 21st December. They will be just 6.1 arc-minutes apart or 1/10 of 1º.

They will be setting over the horizon at 19:10 at the beginning of December and setting at 17:45 by the end of the month. Fortunately the sky is getting dark earlier until 21st December (Winter Solstice). They will be at their closest on 21st December when the pair will be visible together in the field of view of telescopes using a low power eyepiece but they will be setting at 18:15 on that evening. See the chart above.

The two Gas Giant Planets have appeared close together in the sky all summer and will continue to move even closer together until they will appear to be just one object to the 'naked eye'. The converging orbital paths of the planets are shown on the chart below.

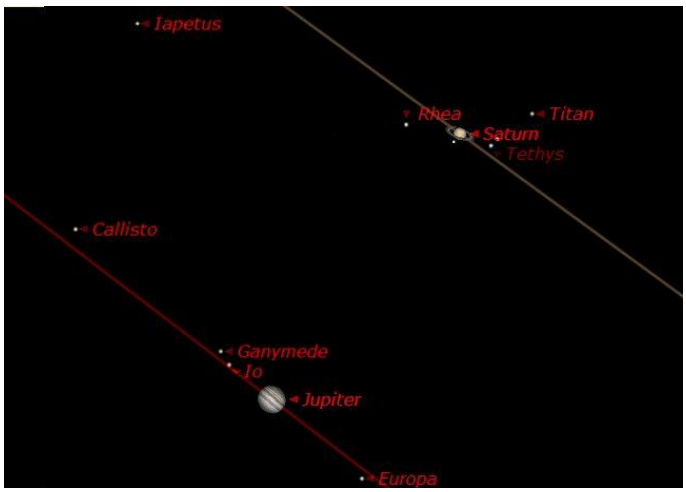


Orbital paths of Jupiter and Saturn 21st December

The Planetary Conjunction this month should go some way to make up for the disappointing views of the planets this year. A clear view to the western horizon will be required to see the conjunction and the early evening sky will be bright just after the Sun has set.

Jupiter and Saturn will not be any closer to each other than they normally are and will still be moving around their established orbits. This conjunction is just a 'line of sight' effect from our point of view on Earth. The two planets will still be as far apart from each other as Earth is from Jupiter (about 750 million kilometres).

Jupiter is appearing to be approaching Saturn as it is moving faster than Saturn along its orbital path and will overtake Saturn on 21st December. From our point of view they will appear very close together so at this time the two planets will be at their closest conjunction.



Jupiter and Saturn at their closest conjunction

The chart above shows how the two planets and their moons will appear using a telescope around the 21st December. They should fit into the field of view of most small telescopes and some larger telescopes using a low power eyepiece. The last time these two planets appeared this close was on July 16, 1623, when they were only 5 arc minutes apart. We will get another 6-arc minute separation on March 15, 2080. Maybe a few of our younger readers will be around to catch that one.

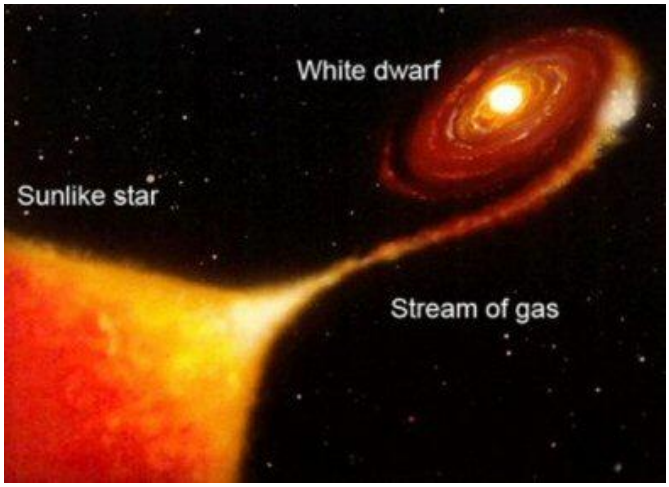
Like all astronomical events the weather must be kind to us and we will need a clear view towards the western horizon. The conjunction will unfortunately also be low in the bright sky just after sunset.

WHAT WAS THE STAR OF BETHLEHEM?

A traditional view we have of the Wise Men and the Star of Bethlehem

For nearly two thousand years scientifically minded people have wondered what was the 'Sign in the Sky' that the Wise Men saw? What sign could have been so important that they would have started a very dangerous journey covering over a thousand kilometres to witness what the sign had foretold? We tend to accept that the Star of Bethlehem was a star but was it a star and if it was is there any evidence of it in the sky today?

If it had been a 'New Star' then it would have been either a Nova or a Supernova in our vicinity. A Nova is a star that is one component of a double star system that has exploded. It would have been the larger of the pair that had reached the end of its time as a normal star and became a small but very dense White Dwarf. The pair of stars would have been a very close double system with the White Dwarf pulling Hydrogen gas off the other star.



A white dwarf feeding off a normal star

The Hydrogen would build up a very dense layer on the surface of the White Dwarf until the pressure and temperature on the surface created a run-away Nuclear Fusion explosion. The explosion (Nova) would cause the star to increase in brightness by millions of times.

When a very large star has used up is available supply of Hydrogen fuel it will explode and destroy itself in a massive explosion called a Super Nova. This causes the star to increase in brightness and shine brighter than all the stars in its host galaxy put together.

A Supernova explosion in a distant Galaxy

For either of these events the stars would have needed to be in our vicinity for them to be seen using the naked eye. If it had been that close then it would have left an expanding cloud of debris that would still be visible today. A Supernova was seen in the year 1054 AD and recorded by Chinese astronomers at the time. The star was located 6000 light years away so the light took that time to reach Earth. The Supernova Remnant can still be seen in the constellation of Taurus. See next page.

The Super Nova Remnant is known as Messier 1 (M1) or the 'Crab Nebula' in the constellation of Taurus.

Messier 1 (M1) the Crab Nebula

There is no evidence that there was a Nova or Supernova anywhere in our local area that can be linked to an event that occurred around 2000 years ago. So this rules out a Nova or Super Nova. Historically there are no reports of a naked eye Supernovae, bright comet or any large meteor strikes so it was unlikely to have been any of these and there is no astronomical evidence. So what was it?

This really only leaves us with one option, that is: there might have been a special alignment of the planets. The Magi (the Wise Men) were expert astronomers who knew the sky well and were able to calculate and predict the movements of the planets very accurately.

We can programme our modern computer planetarium applications to show what was happening in the sky around this time. However we do have a bit of a problem because we don't know exactly when Jesus was born. In fact we also have a problem with our calendars that makes it even more difficult.

A monk called Dionysius produced the calendar on which our modern calendars are based. In the 6th century when Dionysius calculated the dates for the start date of his calendar, he used the length of the reigns of the Roman emperors to calculate back to the date of the birth of Jesus. However he made two major mistakes and possibly a couple of others. This calendar was used as the basis for our Julian calendar so the mistakes were built in and are still there.

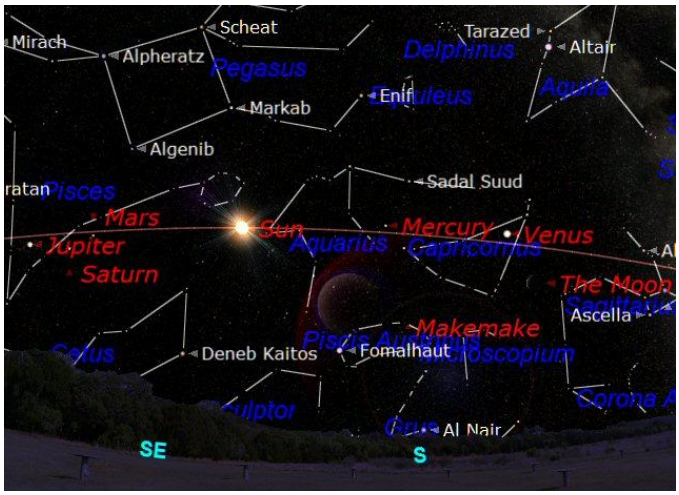
Augustus, Emperor of Rome ruled from 27BC to 14AD but he also ruled under the name Octavius from 31BC to 27BC. Unfortunately Dionysius forgot to allow for these 4 years so they were not accounted for in his calendar. Also the Romans had no concept of the number 0 (zero) so the Dionysius calendar went from 1BC to 1AD with no year zero. From this we can estimate that, if all the Bible stories are true, Jesus was probably born between 5BC and 7BC.

There are three events that could have been very significant to these ancient astronomers who were also astrologers believing that the future was governed by what could be seen in the heavens. The constellations had special meanings for certain regions of the known world and astronomical events occurring in these constellations would affect these regions.

The planets also had special significance, for instance Jupiter would be associated with kings and the constellation of Aries (the Ram) was associated with the region around Judea. So the Magi (the wise men) could have interpreted an event involving these as a sign in the sky that would mean a king was to be born in Judea.

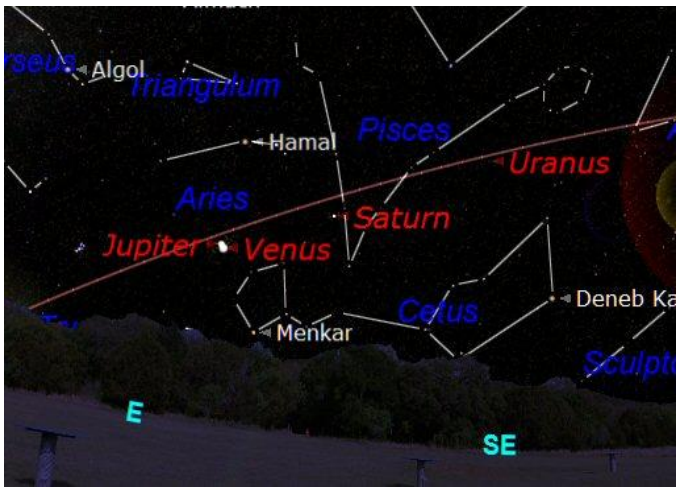
If we check our computer planetarium application we can see there were three interesting astronomical events that occurred in our time frame of 5BC to 7BC. These individually or in combination would also have been of great astrological significance for the Wise Men.

The last event occurred in March 6BC when all the known planets were aligned in the sky. What made this event more significant was the planet Jupiter (associated with a king) was moving into the constellation of Aries (which was associated with the kingdom of Judea). This could have been interpreted as meaning a king was to be born in Judea. The chart below shows the sky as it appeared in March 6BC when viewed from Bethlehem. The planets are shown in the daytime but they could be seen in the dark sky before sunrise and after sunset.

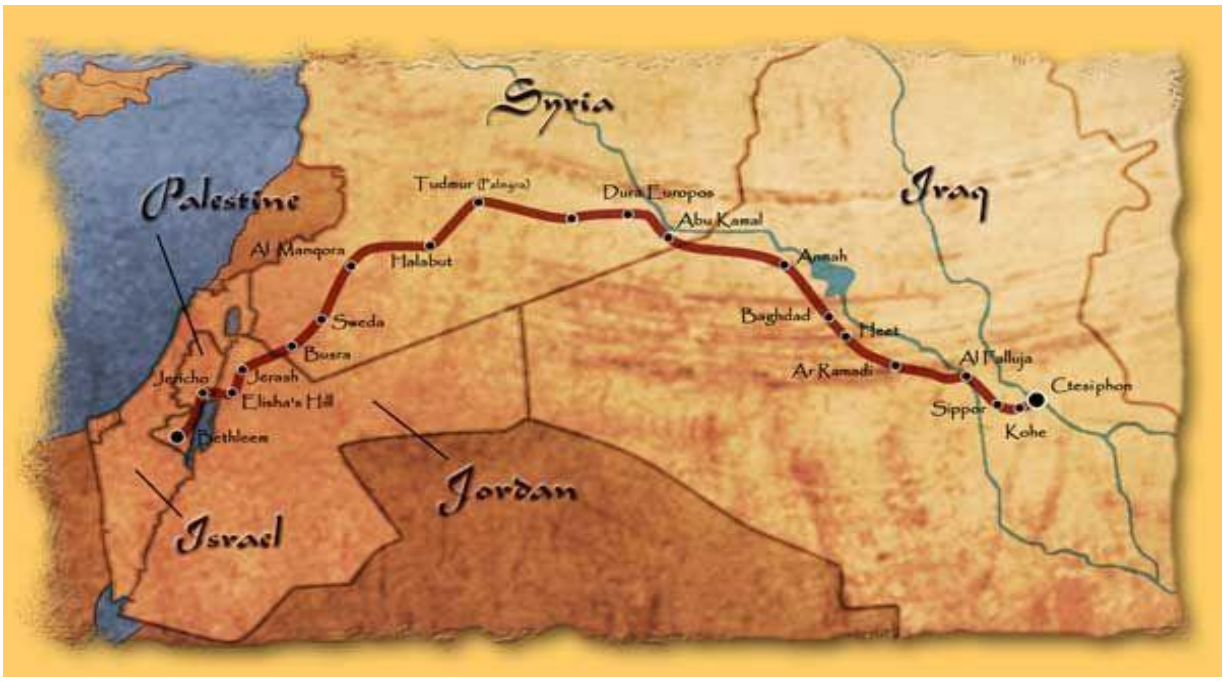


The Planets aligned in March 6BC

The second interesting event occurred on 8th May 6BC when Venus was in conjunction with Jupiter (very close) in Aries and visible low in the east before sunrise. The Chart below shows the sky as it appeared on 8th May 6BC when viewed from Bethlehem. It shows the planets Jupiter and Venus very close together in the constellation of Aries just before sunrise.



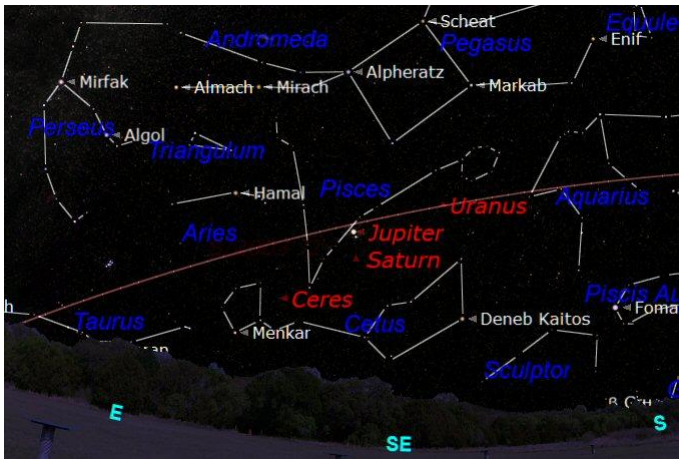
Jupiter and Venus in conjunction on 8th May 6BC



A map showing the route the Wise Men must have taken to Bethlehem

There was third event that was even more interesting in that we have a very similar event happening this year. This is a close conjunction of Jupiter and Saturn on 21st December. See page 2. The event that occurred in 7BC was even more intriguing it was a double conjunction (close approach) of Jupiter and Saturn.

The first of these conjunctions occurred in the early morning sky on 1st June 7BC. The second was on 1st December 7BC in the evening sky. The chart below shows the sky as it appeared from Bagdad at 04:00 (before sunrise) on 1st June 7BC. This first conjunction and the second occurred in the constellation of Pisces, the constellation next to Aries.

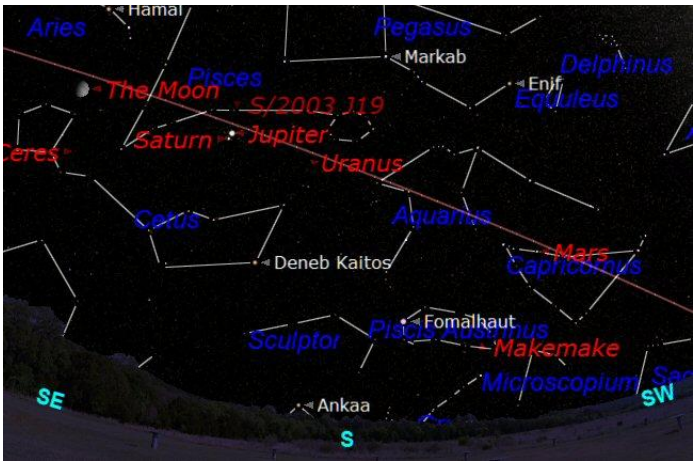


Jupiter and Saturn in conjunction 04:00 1st June 7BC

Jupiter appeared to approach Saturn from the west (right) and was at its closest at the beginning of June 7BC. Jupiter then moved away from Saturn to the east (left) until September 7BC when it began to move back westward and returned to Saturn. Through October and November Jupiter moved closer and closer to Saturn.

Jupiter made another loop around Saturn towards the end of 7BC and into early 6BC. Jupiter then moved eastwards (to the left) again. In late March 6BC Jupiter moved out of Pisces and into Aries. The Jupiter/Saturn conjunctions were then followed by the Jupiter/Venus conjunction on 8th May 6BC. Then all the planets assembled in March 6BC when Jupiter was in Aries.

This is very interesting time because the Magi could have seen the June 7BC event from Iraq where they lived. They could have started their journey then or before and seen the December event in Judea 6 months later. This could have easily been achieved. It is about the time it would have taken them to travel there in 7BC. The chart below shows the sky as it appeared from Bethlehem at 17:00 (after sunset) on 1st December 7BC.



Jupiter and Saturn in conjunction in December 7BC

The Wise Men would have travelled north from Iraq then west and south to take them around the dangerous desert on the only safe route. See the chart at the top of this page. The highly educated Magi could easily have predicted all these very important astrological events and made the decision to travel to see the 'new king'.

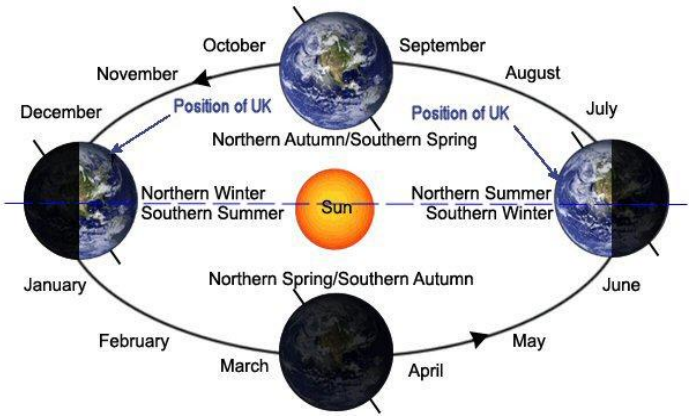
The June conjunction could have predicted the birth of a king and would have been seen from Iraq. The December conjunction might have heralded the birth of the king and they could have seen it as they approached Bethlehem. Interestingly this means they would have seen it occur in the south and above Bethlehem as they approached from the north.

THE WINTER SOLSTICE 21st DECEMBER

The Moon over Stonehenge at the Winter Solstice

The tilt of Earth's axis is the reason we have the seasons that have had a major effect on the evolution of life on Earth. The presence of our large Moon is another major factor. We need to think about the dynamics of our planet Earth and how it moves around the Sun.

Earth's axis is tilted 23.4º from the axis of rotation of the Solar System. Looking at this from another angle Earth's axis is tilted 66.6º from the plane (or equator) of the Solar System. This gives us on Earth some rather odd views of space around us including the apparent movement of the Sun, Moon and the planets. The first thing we need to do is understand how this tilt works.

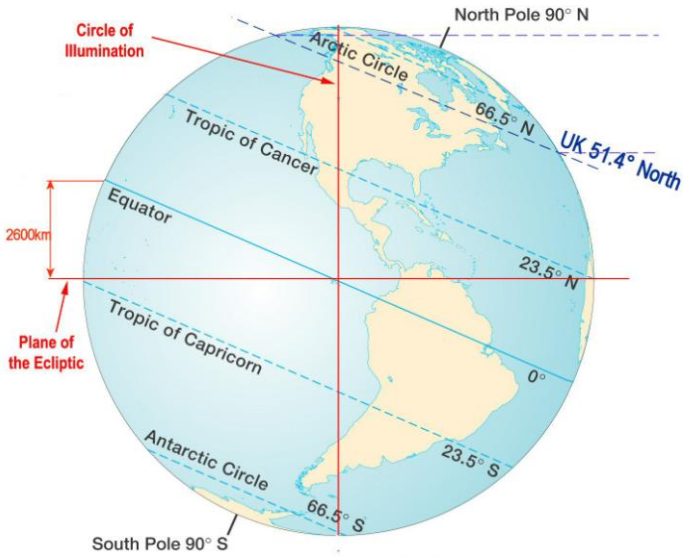


Earth's orbit around the Sun

The tilt of Earth's axis of rotation gives us a rather odd view of our surroundings in space. The first thing to grasp is the way that Earth orbits the Sun. The diagram above shows how the axis of Earth always points to the same place in the sky as Earth moves around the Sun.

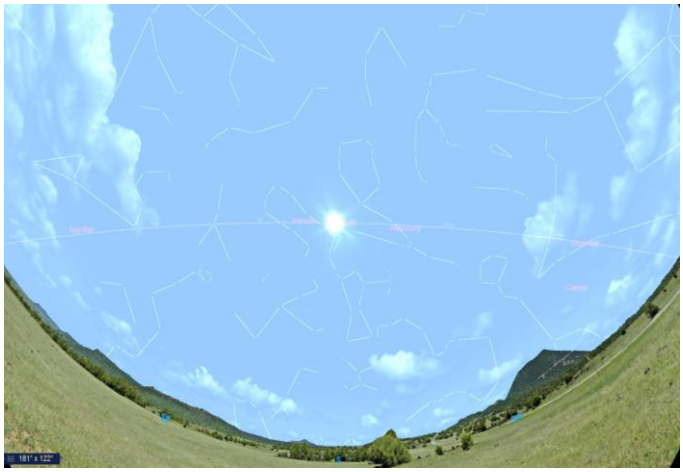
In the diagram above, the representation of Earth on the left shows its position at northern mid-winter. So we in the UK are further above the Solar System Equator due to the North Pole being tilted away from the Sun. On the right the North Pole is tilted towards the Sun and the UK is positioned closer to the Solar system Equator (the Ecliptic). It is therefore Mid Summer (Summer Solstice).

What this means is the equator (the position where the Sun appears to be directly overhead at midday) moves south for the northern winter and north for the northern summer. The furthest position that Earth's equator moves to the north is called the Tropic of Cancer where it will be the Summer Solstice. The furthest south that it reaches is called the Tropic of Capricorn and will be our Winter Solstice. See the diagram below.



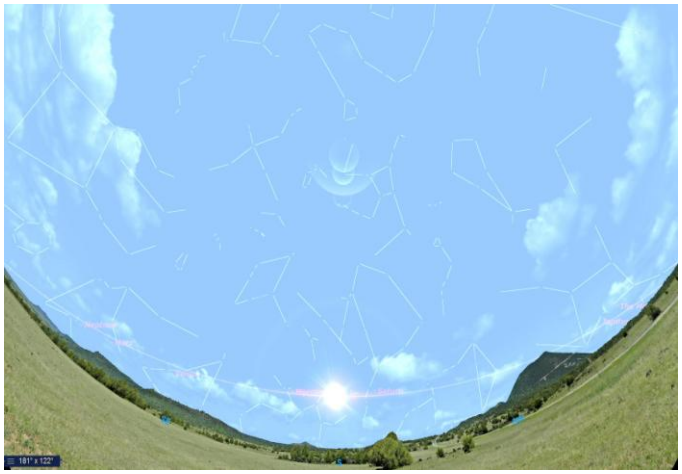
In the diagram above it can be seen that the tropics extend 23.5° north and south of Earth's equator. To put it another way, a point on the surface of Earth (for instance the UK) will move 40055km (circumference of Earth) x (2 x 23.5°)/360° which equals around 5230km from mid winter to mid-summer. So over one orbit of the Sun (1 year), the UK effectively moves 5230km south from its position relative to the Ecliptic from winter to summer and then back again.

As astronomers we have a rather confusing view of the sky around us due to the tilt of Earth's axis. There are however some very noticeable effects that we take for granted and barely notice. The first is: how much the position and height of the Sun above the horizon changes from summer to winter.



The sky at midday on Midsummer Day

The computer generated image above shows the sky at midday on Midsummer Day. The Sun is at its maximum elevation above the southern horizon (We call this the Summer Solstice). Any planets in the sky at this time will be located somewhere along the Ecliptic to either side of the Sun and therefore high in the sky as well.

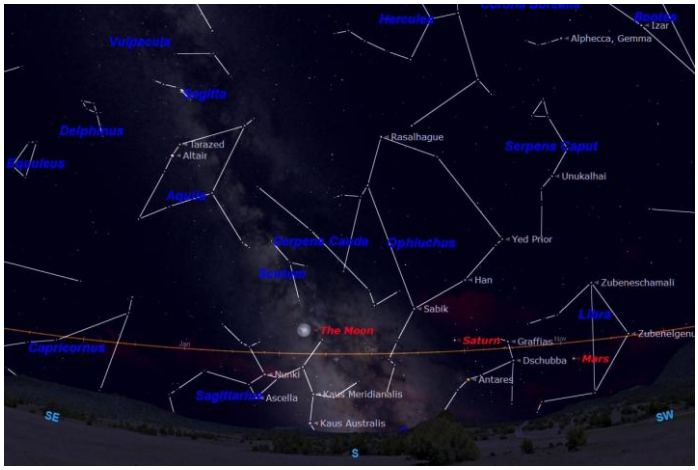


The sky at midday on Midwinter Day

The image above shows the sky at midday on midwinter day (Winter Solstice). When compared to the image at the top, it can be appreciated just how low the Sun appears from the UK in the middle of the winter. The Ecliptic is the imaginary line that represents the equator of the Solar System. The Sun, Moon and planets appear to move along this imaginary line as Earth moves around its orbit about the Sun. As the tilt of Earth's axis always points to the same direction and the same point in the sky the Ecliptic appears to rise and fall from our point of view.

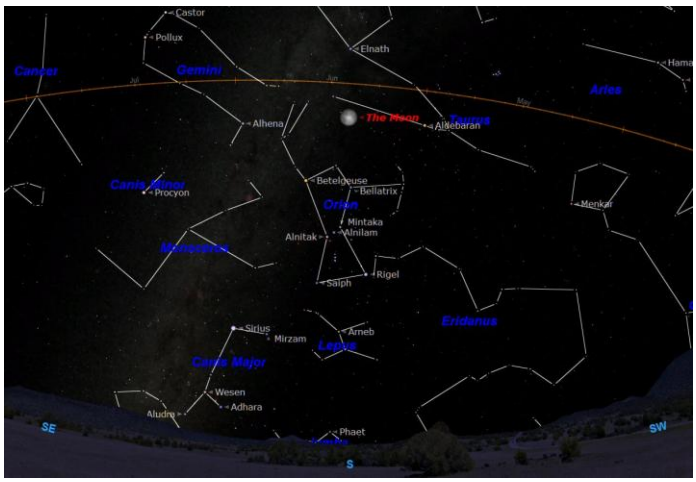
In the northern hemisphere the north pole of Earth's axis is tilted towards the Sun during the summer season. This gives the effect of a point on the surface such as the UK being closer to the equator of the Solar System that we call the Ecliptic. As a consequence the Sun will appear much higher in the sky during the summer. It is also warmer because the Sun is almost overhead.

As Earth rotates on its axis once every 24 hours (1 day) that point on the surface of Earth (the UK) will rise up due to the tilt and the Sun is high in the sky. At midnight when the UK is looking away from the Sun the Ecliptic will be at its lowest point in the sky. The Moon and the planets will also appear low in the night sky.



The sky at midnight on Midsummer Day

The image above shows the how the Ecliptic appears low in the sky at midnight on Midsummer Day (Summer Solstice) when it had been high in the sky during the day. The Moon appears low in the sky during the summer nights and appears large as it rises over the horizon giving us the Harvest Moon and Super Moon effects.

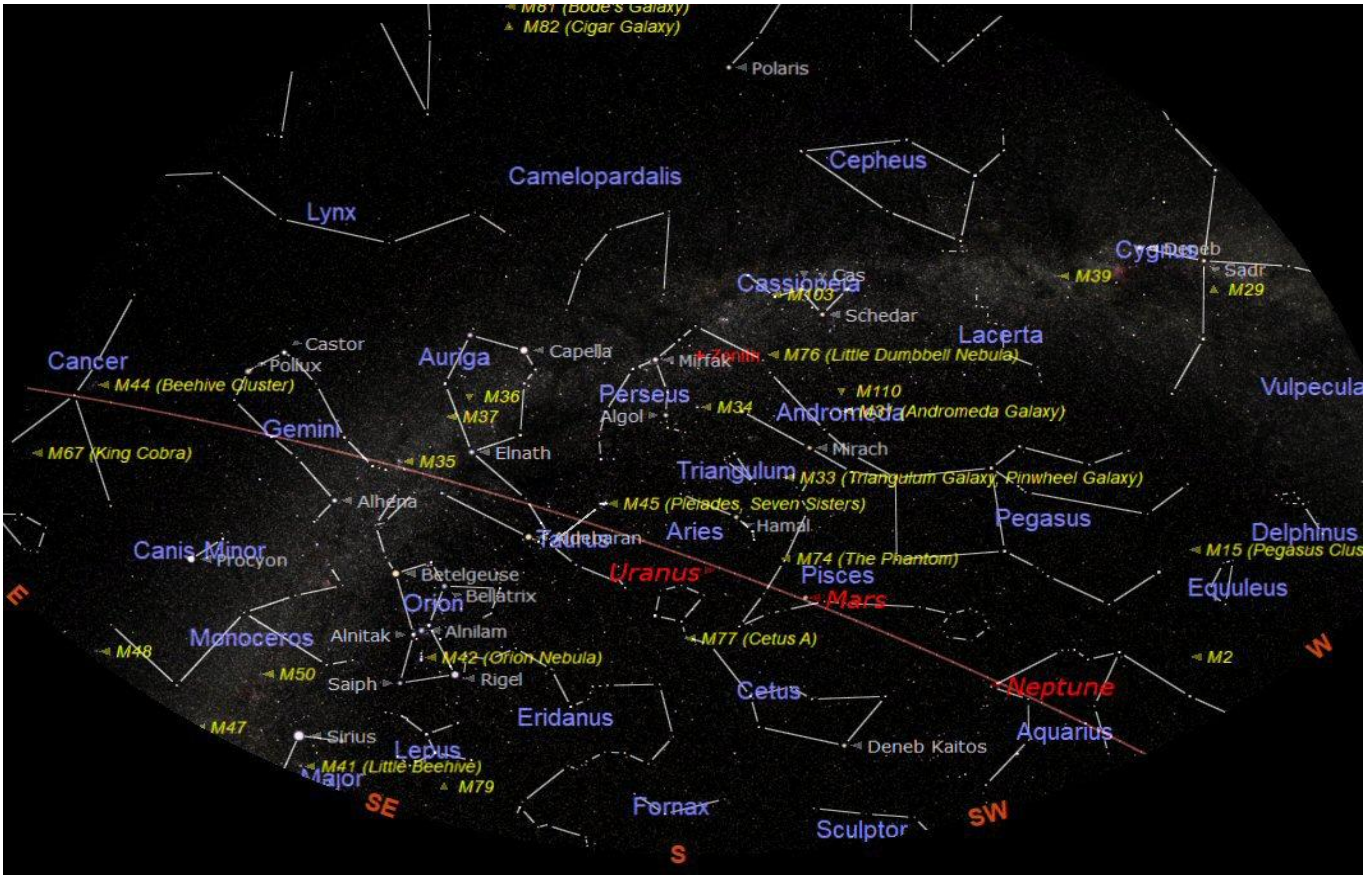


The sky at midnight on Midwinter Day

During the winter nights the ecliptic appears very high in the night sky as can be seen in the image above. In the northern hemisphere the north pole of Earth's axis is tilted away from the Sun during the winter season. This gives the effect of a point on the surface such as the UK being further away from the equator of the Solar System (the Ecliptic) during the day and closer to the north pole of the axis of the Solar System.

As Earth rotates on its axis once every 24 hours (1 day) that point on the surface of Earth (the UK) will move down due to the tilt. See the blue dashed line on the diagram on the previous page. At midnight when the UK is looking away from the Sun it will be at its lowest point and the Ecliptic will appear high in the sky. The winter is the best time for astronomers because the nights are long and the planets and Moon are high in the sky away from the thick and turbulent air close to the horizon.

A TOUR OF THE NIGHT SKY - DECEMBER 2020



The chart above shows the night sky looking south at about 20:00 GMT on 15th December. 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 Sagittarius (the Archer), Capricornus (the Goat), Aquarius (the Water Carrier), Pisces (the Fishes), Aries (the Ram), Taurus (the Bull), Gemini (the Twins), Cancer (the Crab) and Leo (the Lion).

Just disappearing over the south western horizon is the constellation of Sagittarius (the Archer). It is really a southern constellation but we can see the upper part creep along the horizon during the summer. The central bulge of our galaxy is located in Sagittarius so the richest star fields can be found in the constellation along with many of the beautiful and interesting deep sky objects. Jupiter and Saturn will move over the border from Sagittarius into Capricornus on 19th December.

The summer constellations are still prominent in the early evening sky in the west. Only just visible is Hercules (the Hunter). Following Hercules is the Summer Triangle with its three corners marked by the bright stars: Deneb in the constellation of Cygnus, Vega in Lyra, and Altair in Aquila. The Summer Triangle is very prominent and can be used as the starting point to find our way around the night sky. The Milky Way (our Galaxy) flows through the Summer Triangle passing through Cygnus, down to the horizon through the lower part of the Summer Triangle.

The Milky Way flows north from the Summer Triangle through the rather indistinct constellation of Lacerta (the Lizard), past the pentagon shape of Cepheus and on through the 'W' shape of Cassiopeia and down through Auriga and Orion to the south eastern horizon.

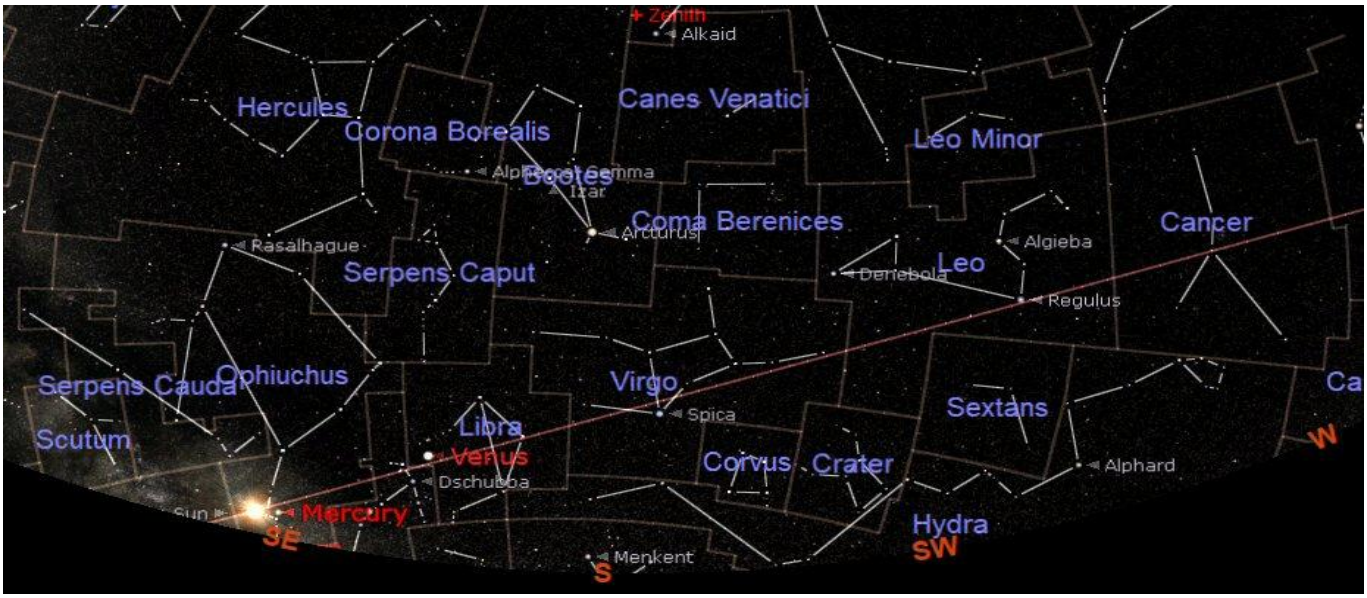
Prominent in the south is the constellation of Pegasus (the Winged Horse). The main feature of Pegasus is the square formed by the four brightest stars. This asterism (shape) is known as the Great Square of Pegasus. The square is larger than might be expected but once found is easier to find again. The Great Square can be used to judge the condition of the sky for observing. If stars can be seen within the square there seeing should be good. If no stars can be seen then seeing will not be good.

Coming into view in the south east is the constellation of Taurus (the Bull). The most obvious star in Taurus is the lovely Red Giant Star called Aldebaran. It appears slightly orange to the 'naked eye' but it is very obviously orange when seen using binoculars or a telescope. Aldebaran is located at the centre of the 'flattened' X shape formed by the brightest stars in Taurus. At the end of the top right (upper west) arm of the 'X' is the beautiful 'naked eye' Open Star Cluster Messier 45 (M45) known as the Pleiades (or the Seven Sisters). It really does look magnificent using binoculars.

Following Taurus is the constellation of Gemini (the Twins). The two brightest stars in Gemini are Castor and Pollux and they are named after mythological twins.

To the south of Taurus and Gemini is the spectacular constellation of Orion (the Hunter). Orion is one of the best known constellations and hosts some of the most interesting objects for us amateur astronomers to seek out. We will be having a closer look at Orion in the January issue of this magazine.

THE SOLAR SYSTEM - DECEMBER 2020



The morning sky at 07:00 showing the positions Mercury and Venus

MERCURY will not be visible this month as it will be too close to the Sun in the east this month. See the chart above (the sky has been darkened to allow the planets to be seen).

VENUS reached its greatest western elongation (at its furthest apparent distance from the Sun) on 14th August. It is still rising in the in the east before the Sun. It is now 'gibbous' (wider than half Moon shaped see below).

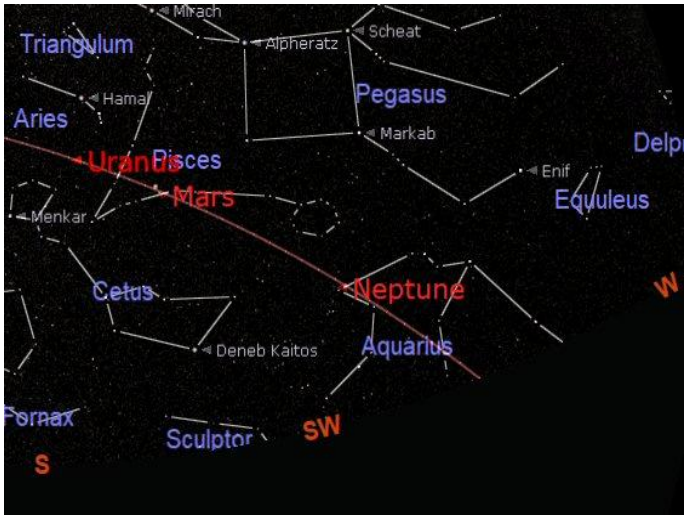
It is moving back towards the Sun and will appear smaller but 'fuller' as it moves into Superior Conjunction (behind the Sun) on 25th March 2021. After passing through Superior Conjunction Venus will reappear in the evening sky in the west as the Sun is setting.

Venus appearing 'Gibbous' during November

After conjunction Venus will first appear close to the Sun looking small and round when viewed using a telescope. As it will be located on the other side of the Sun it will fully illuminated but will become larger and crescent shaped as it moves out from the Sun and towards us.

MARS rises in the east at midday and is still looking quite large at about 17 arc-seconds. Earth caught up and passed Mars on their orbits around the Sun. This was because Earth's orbit is inside the orbit of Mars and is consequently travelling faster. Earth overtook Mars on 13th October and this is called Opposition. At opposition Mars was in direct line with Earth and the Sun.

At opposition Mars was at it its closest point to Earth but is still in a good position for observing in the south all evening. It will be around until May but will be moving closer to the south western horizon. It will also be reducing in size as it moves quickly away from us. After it has moved over the horizon we will not see it again for two years.

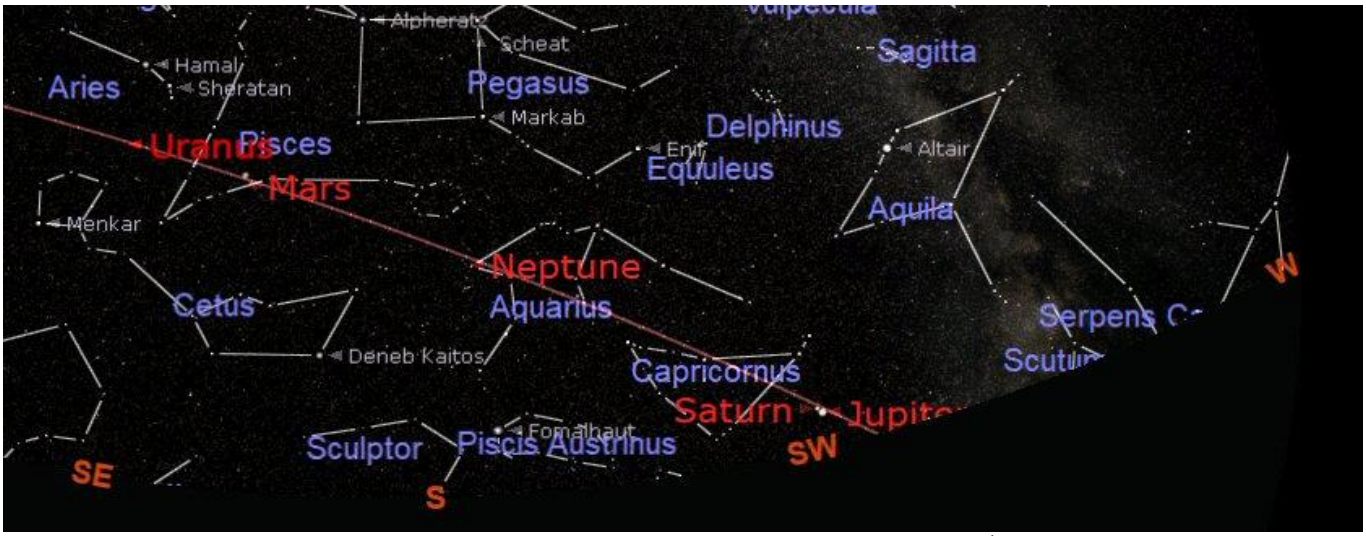


Mars, Uranus and Neptune in the evening sky

JUPITER is now way past its best and visible in the West just after sunset. It will be difficult to see in the bright twilight sky just above the South West horizon. It will be in the thick, murky, turbulent air close to the horizon so the view will be badly distorted so very little detail will be seen. However it will be well worth searching out to see the close conjunction with fellow Gas Giant Saturn. Jupiter and Saturn will be moving closer together during December but will be at their closest point of the conjunction on 21st December. For details see page 2.

SATURN will be very difficult to see in the bright twilight sky just above the South West horizon. See the chart on the next page and on page 12. It will be worth going to a high location (on top of a hill) with a clear view to the South West to see Saturn in conjunction with Jupiter before they disappear over the horizon.

THE REST OF THE SOLAR SYSTEM DECEMBER 2020



Jupiter, Saturn, Mars, Uranus and Neptune early evening on 15th December

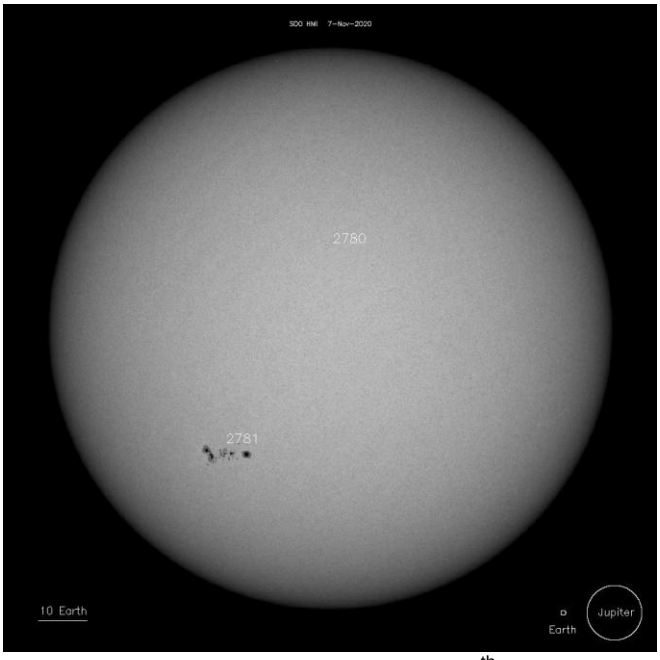
URANUS will not be easy to see as it will be close to the southern horizon. It will rise at about 15:30 and be visible for the rest of the night. Uranus was at opposition on the 31st October. This month it will be due south and at its best at 22:40 but will need a telescope to see it.

NEPTUNE will rise at about 14:00 but will not be easy to observe this month it will be due south at about 19:30. It does require a medium sized telescope to see well.

THE SUN

The Sun rises at about 07:00 at the beginning of the month and 06:40 at the end. It sets at 18:20 at the beginning of the month and 16:40 at the end.

A small Sunspot was seen by the author on 19th October and a nice group was seen in the middle of October. Then another nice group was imaged on 7th November by the Solar and Heliospheric Observatory (SOHO).



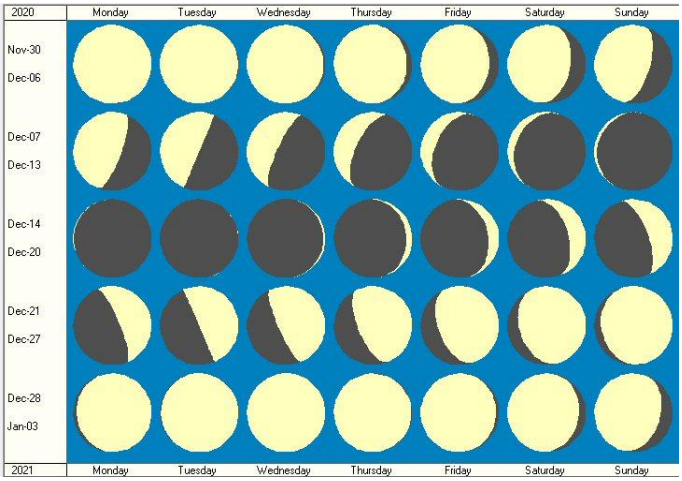
A group of Sunspots from SOHO on 7th November

Sunspots can be observed even without a telescope. Any activity can be followed by downloading the day to day detailed images of the Sun from the SOHO website at: http://sohowww.nascom.nasa.gov/.

For those who are fortunate to have a telescope, Sunspots can be projected on to a small card screen and observed safely. Even better a modestly priced special solar filter can be bought ready to fit and used to observe the Sun directly. These can be fitted over the end of the telescope or inside the Dew Shield. See the picture below. Never look directly at the Sun only look at the Sun using a proper safe solar filter.

The author's Telescope fitted with a Solar Filter

THE MOON PHASES DURING DECEMBER



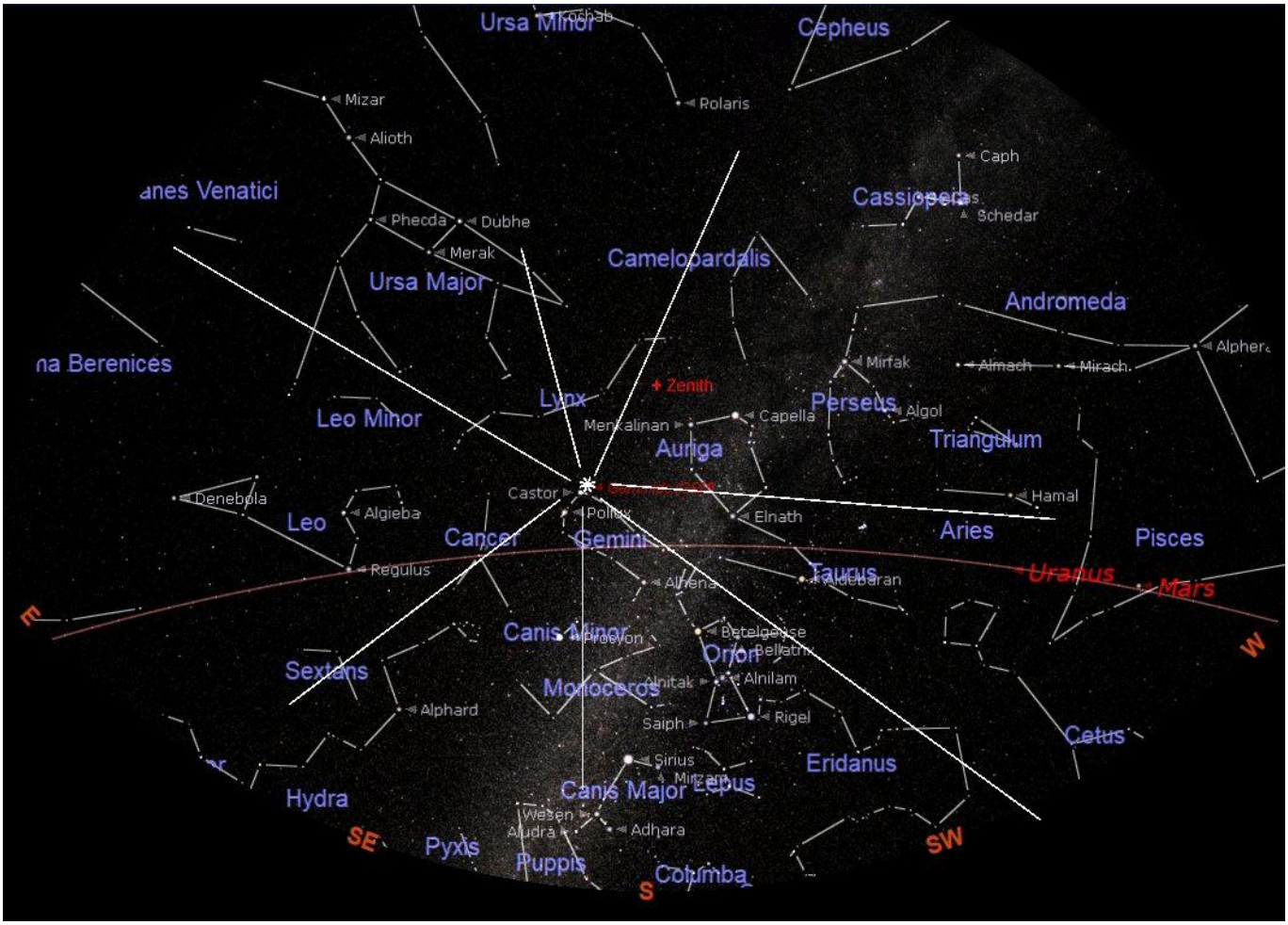
Last Quarter will be on 8th December

New Moon will be on 14th December

First Quarter will be on 22nd December

Full Moon will be on 30th December

THE GEMINID METEOR SHOWER



The Geminid Meteor Shower – showing the Radiant Point in the constellation of Gemini

In the middle of this month, around 8th to 17th December, there will be a meteor shower known as the Geminid shower. There will be a peak in activity during the evening of the 13th and morning of 14th December. The very best time to watch for the meteors will be during the early morning hours on 14th December (at 07:00 the shower should be at its maximum as seen from the UK).

The new Moon will be in the west during the early evening of 13th December but it will be gone by the time any serious meteor watching has started. Conditions look very promising, weather permitting and the sky will be dark and moonless all night.

The type of meteor that occurs in showers usually originates from a comet and is much more common than the 'Fireballs' that originate from asteroids. The Geminid shower for this reason is unusual because it is thought to originate from an asteroid known as 3200 Phaethon. This means that some of the meteoroids (the particles moving through space) may be of a rocky nature so they will often be bright and survive for quite a long time. When they enter Earth's atmosphere about 100km up they might produce a bright and persistent trail.

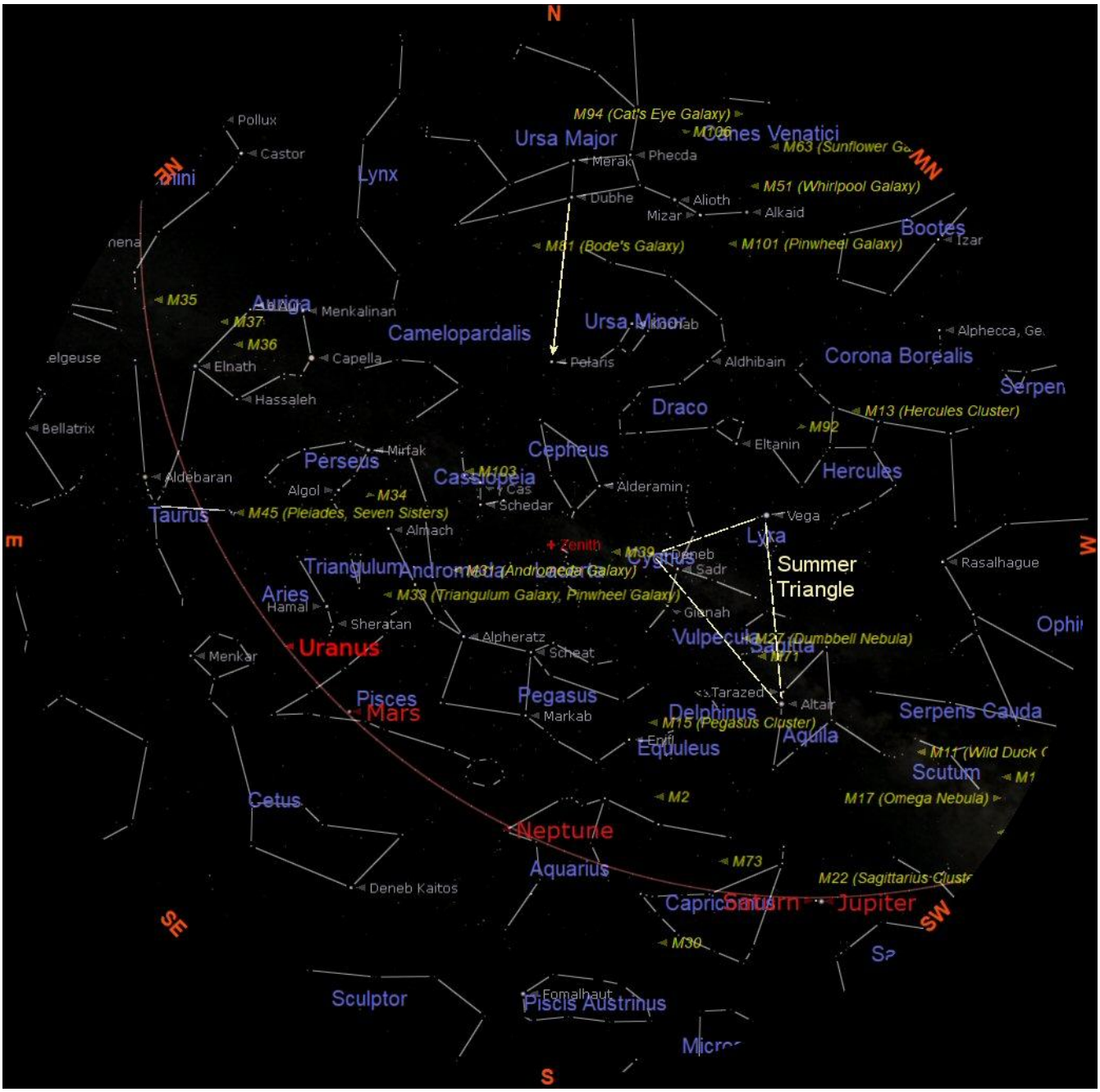
The Geminid meteors also enter the atmosphere comparatively slowly at about 35 km/second compared with other showers that enter at over 75 km/second. As a result of this slower entry and some having a more robust make up, the Geminid meteors may appear brighter and their trails across the sky last longer.

The actual peek of activity will occur at 13:00 on 14th December but will not be visible from the UK as we will be in daylight. Observers in the USA will be luckier as they will be able to see it in their darkness before dawn.

Because the constellation of Gemini is above the horizon from early evening, the meteors can be seen for most of the night and in almost any part of the sky. By midnight the constellation will be almost due south and high in the sky. If you are intending to have a look remember to wrap up warm before you go out because you will soon feel very cold and that will spoil your enjoyment of the shower. Make yourself comfortable in a garden chair and spend at least an hour looking.

Geminid meteor shower composite by Clint Spencer

THE NIGHT SKY – DECEMBER 2020



The chart above shows the whole night sky as it appears on 15th December at 17:00 (5 o'clock) Greenwich Mean Time (GMT). The chart is drawn for 17:00 to show the position of Jupiter and Saturn in CONJUNCTION in the South West. 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 10 o'clock GMT at the beginning of the month and at 8 o'clock GMT 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 in the north. 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, Saturn (in CONJUNCTION), Neptune, Mars and Uranus.