



The Night Sky (October 2020)

BST (Universal Time plus one hour) is used this month. British Summer Time ends on Sunday 25th October 2020

Northern Horizon



23:00 at beginning of the month.
22:00 in middle of month.
21:00 at end of month

Southern Horizon

The General Weather Pattern

October usually takes its cue from September and can be calm and mild. Occasionally the weather develops into an Indian summer in the middle of the month, when unfortunately the nights are foggier. Average rainfall is the same as September, however, late in October storms from the west are more common.

Should you be interested in obtaining a detailed weather forecast for observing in the Usk area, log on to https://www.meteoblue.com/en/weather/forecast/seeing/usk_united-kingdom_2635052 and acquire up-to-date information. You can set it for other locations.

Earth (E)

The clocks go back by one hour from 02:00 BST to 01:00 UT on the morning of Sunday the 25th.

This is still a comfortable time of year for evening observing, as dark nights are becoming longer than daylight, but chillier nights can be expected. Around the autumnal equinox night-time is expanding most rapidly. Throughout this month, the ecliptic is at a very shallow angle of about 15° at sunset. Planets in close line-of-sight to the Sun will be hard to see in the evening twilight. However, the ecliptic rises throughout the night so by midnight a planet like Mars is well placed.

There are many lovely photo-opportunities to be had for dedicated observers. For instance, this might be a nice time to take a look at the Andromeda Galaxy, the most distant object you can easily see with the naked eye.



Cygnus the Swan is still overhead. There is considerable evidence that to the east of η Cyg (Eta Cygni), in the neck of the Swan there is a hidden star, known as Cygnus X-1, a black hole. Consequently, you may find its position, but will not be able to observe it! However, you may impress your friends if they believe you.

The head of the swan, Albireo is the primary star of a magnificent double with a separation of 34 arcseconds from its companion star β 2 Cygni. Even a small telescope or 10 X 50 binoculars can separate them so that you can distinguish their individual gold and blue hues.

Albireo in a low power amateur telescope

There are signs in the east of the glories to come in late autumn and winter.

Artificial Satellites or Probes

You may be interested in observing the International Space Station or other space craft, log on to <http://www.heavens-above.com> to acquire up-to-date information for your observing site.

The Milky Way

As was commented on in September, due to worsening light pollution 60% of Europeans no longer see the Milky Way. Here in South Wales, however, throughout October, in the hours of darkness, the Milky Way lies within 15° of the zenith. At this time of year, on two occasions each night, around 22:00 and 04:00, the plane of the Milky Way can be found directly above our heads at the zenith. Consequently, this is a wonderful time of the year to observe our Galaxy. For instance, dark regions of dust and gas which obscures light from more distant stars can be seen along the Galactic plane from dark-sky locations. These are dust lanes which define the starry spiral arms of the Galaxy. The region along the galactic plane towards the centre of our Galaxy is known as the Zone of Avoidance.



By Steve Jurvetson - Flickr

Sun

The Sun, is in Virgo throughout this month, except on the last day when it moves into Libra. It no longer rises as high in the sky as it does in the summer. Solar activity is quite unpredictable; consequently, solar cycle 25 is expected at this time, with some uncertainty and may already be underway. Reversed magnetic polarity sunspots positioned at higher latitudes on the face of the sun (indicative of a new cycle) are being observed. It takes about six months of solar observations to have confidence in the data, it is clear, however, that cycle 25 is imminent.

You can receive aurora alerts automatically from the web. Search AuroraWatch for an app suitable for you. If you have any news of aurora or sunspot activity your colleagues would be interested, so let us know.

Also a good place to check out the solar activity “today” is this NASA website <https://sdo.gsfc.nasa.gov/data/>.

Moon

There are two full Moons this month.

The first Full Moon on 1st at about 21:05 in the constellation of Cetus, is commonly called the Harvest Moon*.

The Last Quarter is on 10th at about 00:40 in the constellation of Gemini.

The New Moon is on 16th at about 19:30 in the constellation of Virgo.

The First Quarter is on 23rd at about 13:25 in the constellation of Capricornus.

The second Full Moon is on 31st at about 14:50 in the constellation of Cetus.

The Moon is at apogee (most distant from Earth) twice this month; on the 3rd and on the 30th and is at perigee (nearest Earth) on the 17th.

The Moon rises near the Hyades at 20:30 on the evening of 6th.

*The names of full moons were, at one time, associated with the names of the lunisolar months in European countries and some say Native American tradition. The Romans, with the introduction of the Julian calendar, helped to decouple that tradition, as did the Gregorian calendar. However, in recent times naming full moons has been revived and has taken hold in urban myth.

According to folk-lore, the Harvest Moon is supposed to be the full moon nearest the autumnal equinox; the 1st October this year. The fallacious myth is that it is used as illumination when the harvest is being gathered after sunset; the earliest and latest date for the Harvest Moon can be four weeks apart and crops are ripe when crops are ripe, dependant on many things including the weather, but not an arbitrary date.

The Planets (From the Greek ἀστὴρ πλανήτης (astēr planētēs), meaning wandering stars)

During this month Jupiter, Saturn, Neptune, Mars, Uranus and Venus form a procession across the southern sky, which is spreading out. They can no longer be seen in the sky at the same time.

♿ **Mercury (Me)** sets 20mins after the Sun on the 1st of October when it is at greatest eastern elongation and so is in full glare from the Sun and does not present itself for observation this month. It is at inferior conjunction on the 25th.

♀ **Venus (V)** is a morning object, appearing before 3:30 throughout this month. Dedicated observers could still be up, but otherwise it might be a nice uplifting sight if you get a chance to observe it.

♂ **Mars (Ma)** is at its closest to Earth on the 6th and at opposition on the 13th. In mid-October it rises before 18:00 and all month it can be observed throughout the night, and can be found in the south-eastern corner of Pisces. This is a very good opportunity to observe Mars. It will be closely accompanied by the moon on the morning of the 3rd.

♃ **Jupiter (J)** and Saturn, at the beginning of the month first appear in the evening twilight about 15° above the southern horizon. Jupiter can be observed from 19:00 until around 23:00 at this time; later in the month it appears about 17:00 and sets at around 20:00. It can be found in the constellation of Sagittarius throughout October. Saturn can be found following 7° behind. A photo-opportunity occurs in the evenings of the 28th and 29th when the waning gibbous Moon joins the pair.

♄ **Saturn (S)** and Jupiter both culminate below 16° in twilight, in the constellation of Sagittarius. By the end of the month Saturn culminates just after 15:00 and will be most conveniently placed for casual observers when it can be seen earliest. Observers will, by now, be aware that these giant planets are approaching one another more and more rapidly.

♅ **Uranus (U)** is best observed in the evenings at the end of the month when, on the 31st it reaches opposition and culminates at 23:30. It can be found in the constellation of Aries at RA 2h 25m 37s, Declination 13° 55' 49", at a magnitude of 5.66.

♆ **Neptune (N)** arises in the evening twilight all month, and is best observed at the end of the month when it culminates at a reasonable time in the evening: about 20:30. It can be found in the same location throughout October in the constellation of Aquarius at RA 23h 19m 1s, Declination -5° 36' 50". It only has a magnitude of 7.84 and may need a 150mm or greater telescope with decent magnification to even get a glimpse, but you might like to try with a good pair of binoculars on a tripod. Neptune is easy to see with any binoculars but you would need something bigger than 150mm to see anything more than a star like object, it has a diameter just over 2" which is below the limit of resolution by eye in the UK (owing to seeing effects) a 250 to 300 mm class instrument may allow an image of a tiny disk to be made - just.

Neptune and Uranus will be more conveniently placed later in the year.

Meteors

The Orionids can be seen emanating over the eastern horizon at about 11.00 pm between 16th and 27th October. With a ZHR around 20, these meteors can be very fast with persistent trains; the meteoroids hit the Earth's atmosphere at around 65 km/s. The maximum is around the 22nd. This is the second shower associated with Comet P/Halley (the first, the Eta Aquarids, is in May), and has its radiant in the north of Orion. At this time of year Orion has fully risen by around midnight, and the first quarter Moon sets at 22:00 this year, so conditions are very favourable.

Constellation Culminations from Usk

A celestial body or region of the sky is said to culminate when it crosses an observer's meridian (an imaginary line drawn overhead and through both celestial poles). This is the highest it can be found in the sky. All other things being equal it is also, usually, best observed in this position as the light from it travels through the least amount of atmosphere.

Constellation	Convenient Culminations	Midnight Culminations	Observability
Cygnus	20:00 Mid-October	Mid-August	Whole at zenith
Delphinus	20:00 Mid-October	Mid-August	Whole constellation
Vulpecula	20:00 Mid-October	Mid-August	Whole constellation
Equuleus	20:00 Late October	Late August	Whole constellation
Capricornus	20:00 Late October	Late August	Whole but poor; low in the murk
Microscopium	20:00 Late October	Late August	Low in the murk and partially hidden

Pegasus (pronounced peg' ah sus) The "Winged Horse"

In Welsh

Pegasws *nm*. The standard International Astronomical Union (Latin) name, Pegasus, is used with Welsh spelling. Y Ceffyl Asegellog. 'The Winged Horse'.

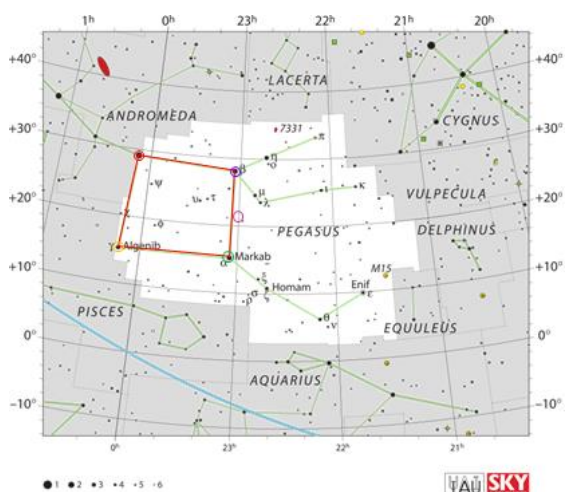
Astronomy

Pegasus can be seen due south and high in the sky at around 21.00 late in October and in the beginning of November, and is the most prominent constellation at this time of the year.

The 'Square of Pegasus' consists of four second or third magnitude stars, and this vast asterism is fairly obvious because other bright stars are absent from inside the borders of the square. An interesting experiment is to count the number of stars you can see with and without a pair of binoculars.

The region within the 'Square of Pegasus' can be used to indicate the quality of sky at your observing location. On a clear, dark night using only your naked eyes, count the stars you can see inside the square.

A poor sky, as seen from a city, usually presents none.
 An average sky around South Wales has one or two stars available.
 A good dark site, like the Brecon Beacons, should reveal about five.
 At an excellent site, in theory, up to thirty-five stars may be visible. Please tell us where this is!

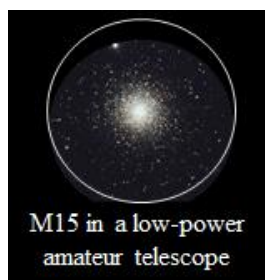


Not all the stars of the square belong to the constellation of Pegasus. One star from Pegasus is now the head of Andromeda. Alpheratz (α), the north-easterly star of the square was finally designated as within the boundary of the constellation of Andromeda in 1928. Alpheratz means 'navel of the steed' in Arabic, revealing some of its history.

From Alpheratz (α Andromedae), in a clock-wise direction, the brightest stars of the square are Scheat (β Pegasi) a variable, orange-red giant star, spectral type M, Markab (α Pegasi) a B9 type star, and Algenib (γ Pegasi) a B2 type star. They lie at 199, 140 and 333 light-years respectively.

In 1995 a planet at least half the size of Jupiter was discovered orbiting the star 51 Pegasi (δ), (half way between Markab and Scheat, slightly outside the 'square') which is about 50 light-years from the earth. This marked the first time a planet was

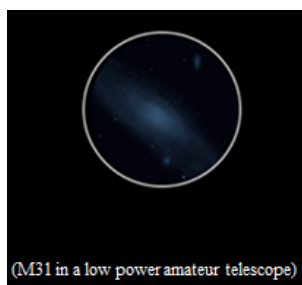
detected orbiting a sun-like star outside the solar system. 51 Pegasi is 1.3 times more luminous than the Sun, but is a fifth magnitude (5.49, just short of sixth magnitude) star in our sky, and hardly visible to the naked eye.



M15 in a low-power amateur telescope

Away from the square, Enif (ε Pegasi), *Al-Anf* in Arabic, which means 'the Nose', is a very bright orange K type star. Search ahead of the nose, with a pair of binoculars, to find M15 a globular cluster, one of about 150 in orbit around our Galaxy. At a magnitude of 6.40, it can only be seen as a fuzzy haze. M15 lies at a distance of 33,600 light-years is about 175 light-years across and has one of the most densely packed cores of the globular clusters in the Galaxy. The nucleus is thought to have collapsed around a black hole. It appears to be around 12 billion years old.

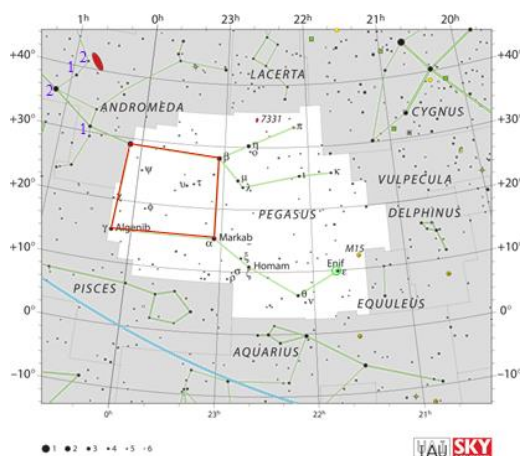
First discovered in 1746 by Jean-Dominique Maraldi, by 1764 it was incorporated into Messier's catalogue. A 150 mm telescope is needed to start resolving stars.



(M31 in a low power amateur telescope)

A little to the north-east of Pegasus we find the constellation of Andromeda, within which we find the Andromeda Galaxy M31.

Start from the head of Andromeda, Alpheratz, and the north-easterly star of the square. Count two stars along the curve of Andromeda turn right and count two more stars to find the galaxy.



Greek Myth



The bright 'square' that dominates the autumn sky is supposed to represent the torso of a winged, white stallion galloping across the night's sky. It appears upside down to our modern eyes.

Many myths surround the birth of Pegasus. One, in which the steed is born in spectacular fashion, starts with a local king Polydectes who wanted to marry Perseus' mother Danae. Polydectes



didn't like Perseus and hoped to get rid of him. He gave Perseus the task of killing the Gorgon Medusa. A difficult task as anyone looking directly at Medusa would be turned to stone. The goddess Athena helped Perseus by giving him a bronze shield so that he could look at Medusa's reflection. Pegasus, who was fathered by Poseidon, sprang from the blood of the neck of Medusa as it hit the ground as Perseus slew her.

In another myth, Pegasus was tamed by Bellerophon, a young man whose heroism equalled Cadmos and Perseus. With the help of the goddess Athena who supplied a golden bridle, they heroically killed a monstrous dragon, however, Bellerophon became proud and foolish and tried to ride to Mount Olympus, the home of the gods, but Zeus saw this and sent a gadfly to sting Pegasus.

Another variation on the myth says that Pegasus refused to take him and in both stories Bellerophon was thrown to the ground. He fell into a thorn bush and was either lamed or blinded, some say both. Bellerophon wandered the Earth in poverty until he died.

Aquarius (pronounced uh-QUAIR-ee-us) - The "Water Bearer" (Aqr)

In Welsh

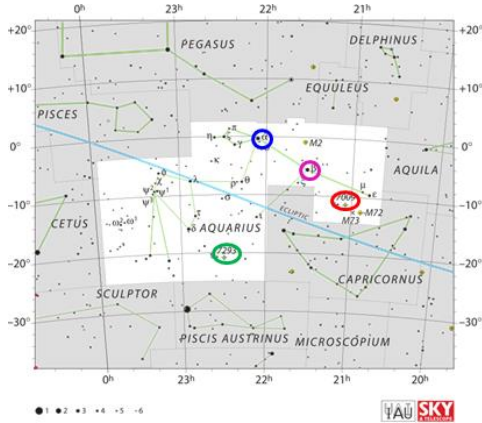
Cludwr Dwr (), literally 'the Water Bearer', or 'Water Carrier' the transliterated meaning in Welsh

Y Cariwr Dŵr (nm), literally 'the Water Carrier', the transliterated meaning in Welsh

Dygiawdr Dwr

Dwr-gludydd

Astronomy



Aquarius, one of the oldest of constellations, was included in Babylonian star catalogues on clay tablets by 1200 BCE. The Babylonians derived their constellation stories from the Sumerians, and are expected to be much older. It is a zodiacal constellation which is best observed throughout October when it culminates around 22:00. In the middle of the month from here in South Wales, Aquarius is positioned around 30° above the horizon at this time, below the constellation of Pegasus. The ecliptic runs through the constellation making for occasional opportunities to observing lunar occultations.

The stars in Aquarius are not particularly conspicuous, although there are over 50 visible stars only two are brighter than magnitude 3.00. Sadalmelik (α Aqr) (ⓘ) has an apparent magnitude of 2.94 and is around 520 light-years from Earth. Sadalsuud (β Aqr) (ⓘ) is approximately 540 light-years from Earth and has an apparent magnitude of 2.91, just a smidgen brighter than Sadalmelik presenting yet another example that

the brightness of stars does not always strictly follow the Greek alphabet.

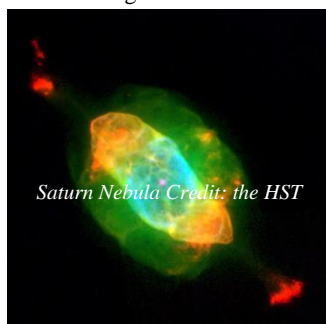
The direction in which Aquarius lies is some 30° to 80° from the galactic plane and not surprisingly we can observe objects deep in space, some even outside our galaxy. The majority are galaxies, globular clusters and planetary nebulae.

Planetary Nebulae

One famous planetary nebula, another favourite of amateur astro-photographers at lower latitudes because it is so big, is the Helix Nebula (NGC 7293) (ⓘ).



It is one of the closest planetary nebulae to us at approximately 655 light-years. It culminates at around midnight in mid-September becoming more convenient by the end of October when it is best observed with 10x or higher magnification binoculars at around 17:00 (at culmination). It can still be seen culminating in the dark up until mid-December. However it does need a good dark sky to observe. The big problem with seeing anything in Aquarius from Wales is its low altitude, even with a telescope it can be a challenge to see the Messier objects.

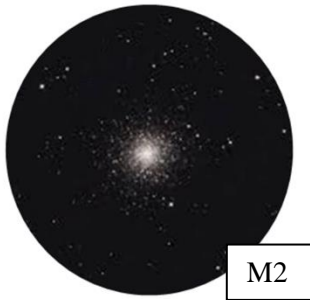


You would be very lucky to see the Helix nebula from Wales, our "chair" has I never looked for it; it culminates at 17°, which is very low to observe a nebula.

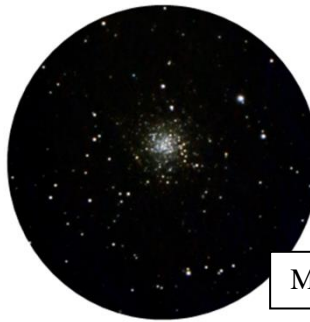
The second planetary nebula to be found in Aquarius is the Saturn Nebula (NGC 7009) (ⓘ), so called because it appeared to Lord Rosse through his famous telescope, 'Leviathan of Parsonstown', to bear a resemblance to an image of Saturn. Leviathan was the largest aperture telescope in the world for 72 years through the second half of the nineteenth century until the early twentieth. NGC 7009 at 3000 light-years is much farther away than NGC 7293 and is smaller. If your telescope is up to it and the skies are really dark, you may be able to discern a blue-green hue.

Globular Clusters

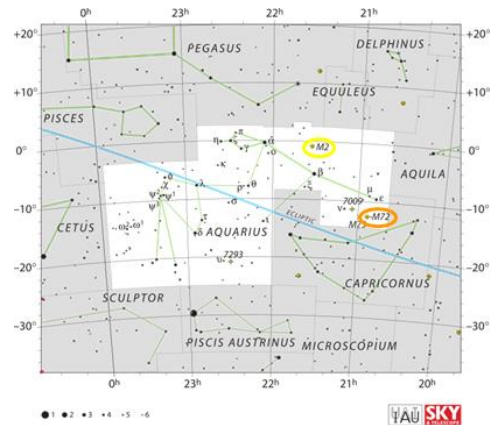
When globular cluster M2 (O) is observed under really good skies it can be found with the naked eye, however, it can be seen to be something greater than a star just with binoculars. The more powerful a telescope to a certain extent, the more definition is found in this star system. This cluster has an approximate diameter of 175 light-years and an age of 13 billion years. Amongst its 150,000 stars the brightest are red and yellow giants. M2, with its compact core, and rich, elliptical star system, is one of the largest known clusters and is the oldest globular cluster attendant to our galaxy.



M2



M72



Globular cluster M72 (O) on the other hand is just visible in a 7.5 cm telescope. Under good seeing conditions and dark skies; you may just resolve stars with anything bigger. It is one of the smallest and faintest objects in the Messier catalogue, and in mid-October is best found culminating at 20:00. From Albali (ϵ Aqr) drop 3° south and 1.5° east.

M72 is around 15 million years old and is located in the region of 54,570 light-years from us.

Galaxies

Aquarius is home to several galaxies numbered in the lower teens. Most are beyond the reach of amateur 'scopes but here are a few to try.

NGC 7727 (O) is a 'peculiar' galaxy, that is it is of unusual size, shape, or composition which some take as evidence that it is the result of two colliding galaxies. Consequently some amateurs pay particular attention to NGC 7727 for it is in this environment that supernovae often present themselves. Around 5% to 10% of galaxies exhibit such traits.

It is thought that one of two star-like bodies at the core of NGC 7727 is in fact the remnant of the nucleus of one of the spiral galaxies that collided. Evidence exists for the formation of over twenty globular clusters in orbit around NGC 7727.



NGC 7727 Credit: the HST

Another peculiar galaxy, NGC 7252 (O) is also called the 'Atoms-for-Peace' galaxy, because of its supposed similarity to the appearance of a simple model of an atom. Images beyond the scope of amateurs reveal tails of stars dust and gas, displaying loops and arcs which in school textbooks might illustrate the structure of an atom. In amateur telescopes NGC 7252 can only be seen as a faded nebulous blotch.

NGC 7252, like NGC 7727, is a glimpse of a moment in time in the evolution of two large colliding galaxies. By studying more examples of them we will be able to improve our models of this process.



NGC7252 Credit: the ESO

Myths

The International Astronomical Union's use of the modern constellation of Aquarius is well founded. Over the millennia the constellation of Aquarius has been associated with water as the common thread. Myths from many cultures and civilisations over millennia have identified it with a water-carrier or water-bearer.

Sumerian

One myth has their water-bearer causing a worldwide flood when he poured water over the land.

In another myth, Aquarius was the Sumerian god Enki who actually rescued mankind from the flood. He is often depicted with the two rivers Tigris and Euphrates pouring over his shoulders.

Babylonian

To the Babylonians Aquarius and the Sumerian god Enki was associated with the god Ea; GU.LA "The Great One". Ea was a water-bearer god portrayed pouring water from a brimming Urn, a belief that was connected to the occasional catastrophic floods which could devastate their



lives, an event known to them as the curse of the rain. The Babylonians traditions evolved directly from the Sumerians, with a few tweaks here and there.

Egyptian

Aquarius to the Egyptians was the god of the Nile, Hapi who in early spring poured his Urn of water into the river, again causing floods at times, but this time to nourish the farmland on which food was grown.

Greek

You may recall that in legend it was Aquila the 'Eagle' who was dispatched by Zeus to carry Ganymede to Olympus where he eventually became Zeus's personal water-bearer. It is said that Ganymede was eventually placed in the sky by Zeus to become the constellation of Aquarius the 'Water Bearer'.

Roman

The Romans mythology was closely aligned to that of the Greeks. So the legend of Aquarius is similar with details changed, and names were Latinized, like Zeus who became Jupiter.

Arabia

In the Arab world Aquarius does not take living form, it is forbidden in Arab religious philosophy, it is however, a Bucket.