

Lundmark Panorama and Sky in July

2 July 2020

Clive Davenhall told us the interesting story of the Lundmark Panorama and Horst covered the Sky in July at our online meeting on Wednesday 1 July.

You can catch up with the video from the meeting on our [YouTube channel](#).

BioRock: wee miners in space

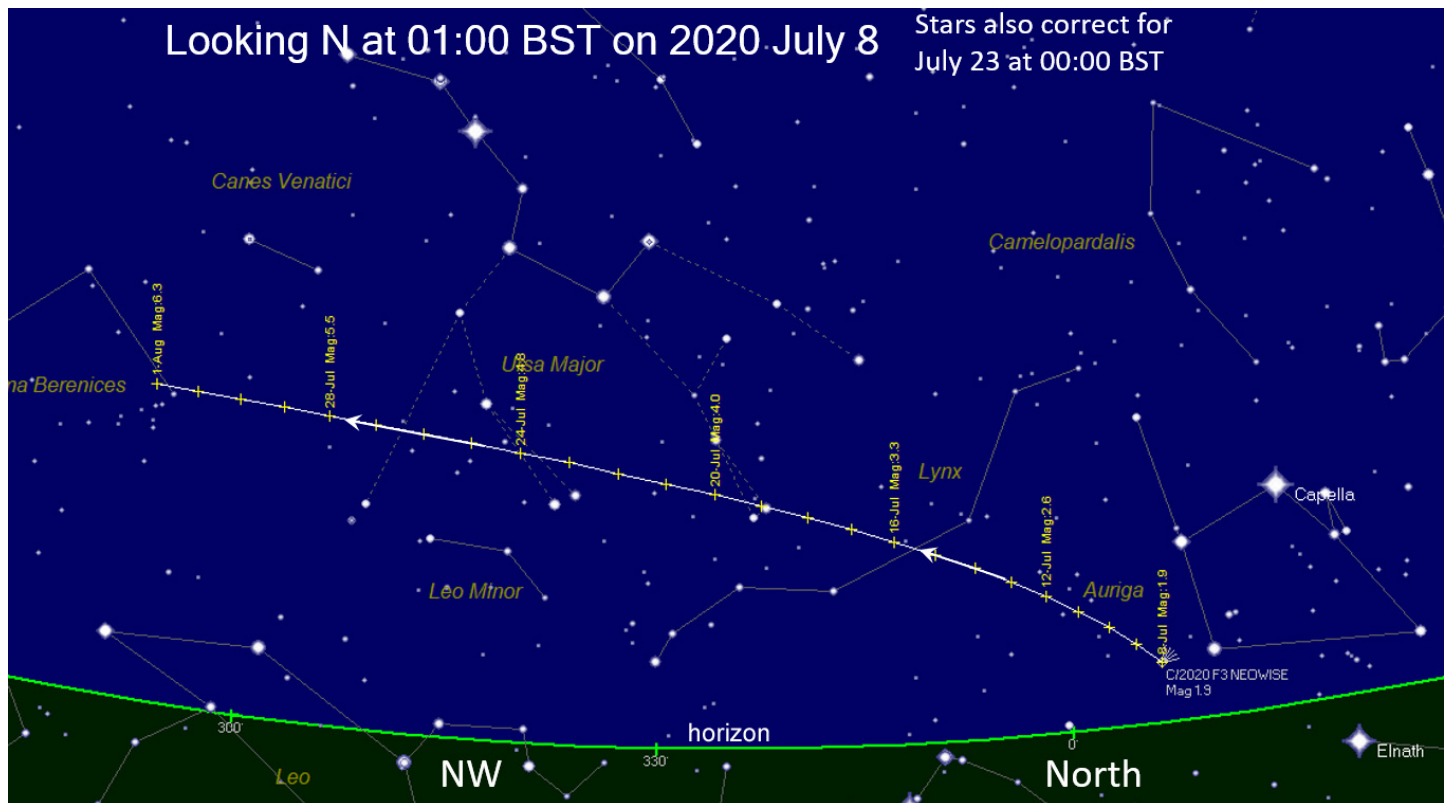
4 July 2020

We had a very comprehensive, enthusiastic and fascinating talk from Dr Rosa Santomartino on the BioRock project. Definitely something outside of our normal topics and great to hear.

Catch up with the talk again on the video on our [YouTube channel](#).

Third time lucky with Comet NEOWISE

7 July 2020



The fact that we have a respectable comet at last may be a case of third time lucky. After two disappointing comets this spring, Comets ATLAS and SWAN, we should be able to spot Comet NEOWISE during July as it moves through a region of sky that is circumpolar for Edinburgh, in that it is always above our horizon.

The comet, dubbed officially C/2020 F3 (NEOWISE), was discovered by NASA's Wide-field Infrared Survey Explorer space telescope on March 27 and was watched from the southern hemisphere until it disappeared into the Sun's glare in June. After our earlier cometary disappointments, there were fears that it, too, might fizzle out as it approached its perihelion, 44 million km from the Sun, on July 3.

Fortunately, it didn't, and northern hemisphere observers were treated to a naked-eye object with an upwards pointing dust tail as it began to climb from the morning twilight in early July. Estimates of its overall brightness were generally in the range of magnitude zero to two.

Our chart plots its motion during July and shows the lower half of the sky between the NW and N in the middle of the night. During the period, Comet NEOWISE tracks from Auriga, across the constellation of Lynx and through the feet (paws?) of Ursa Major, below the Plough. Ticks al

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track mark its daily position at midnight, while the magnitude values alongside the dates can be little more than a guess.

Although it is now receding from the Sun and is expected to fade, this is slightly countered by the fact that the comet is approaching the Earth and will pass 103 million km from us on July 23. Binoculars, or a low-power telescope, may give us the best views and it should be a tempting target for astrophotography.

Calculations of its orbit suggest that its previous perihelion occurred some 4,500 years ago and, given that planetary gravitational forces are giving it a slight kick this time around, it may not return to the Sun for another 6,800 years. So, catch it while you can.

Things that go BANG in the night meeting report

11 July 2020

What a fabulous talk we had from our Honorary President Professor Andy Lawrence. Always a delight to have a talk from Andy and as usual he gave us something to make us think.

Or the name might be, as he suggested, things that go FLASH in the night? Transient events of many forms plus a citizen science challenge. How can we, as amateurs, get involved? Watch the video to find out more.

Here's a link to the [Lasair Transients and Variables](#) project that he mentioned.

Watch the video on our [YouTube channel](#).

Is Earth Special?

18 July 2020

Very thought-provoking talk from Prof Dave Waltham last night. Did we get a Yes or No answer? See what you think.

Sorry for the delay starting if you were waiting on our YouTube channel..

Watch the video on our [YouTube channel](#).

Parker Solar Probe meeting report

22 July 2020

What an enthusiastic, exciting and engaging talk we had from mission Senior Scientific Officer Dr. Nour Raouafi live from John Hopkins University, Maryland. It's clearly one of the most exciting missions on the go at the moment and it's going better than they ever expected!

Catch up with this talk on our [YouTube channel](#). Not one to miss!

NASA's historic Parker Solar Probe mission is revolutionizing our understanding of the Sun, where changing conditions can propagate out into the solar system, affecting Earth and other worlds. Parker Solar Probe travels through the Sun's atmosphere, closer to the surface than any spacecraft before it, facing brutal heat and radiation conditions to provide humanity with the closest-ever observations of a star.

Intro to Astro-imaging Part 5 online

25 July 2020

Welcome to

Introduction to ASTRO-IMAGING PART 5

- Part 1 - Basic Imaging
- Part 2 - Stacking and EAA
- Part 3 - Hi-res lunar, planetary and solar video
- Part 4 - Deep Sky long exposures
- **Part 5 - Imaging for science projects**

The Astronomical Society of Edinburgh

4 **STEPS**

www.astronomyedinburgh.org

The fifth part of our Intro to Astro-imaging course covered imaging for science projects at our online Zoom meeting, also broadcast on YouTube.

You can watch the video below or on our [YouTube channel](#).



YouTube video player

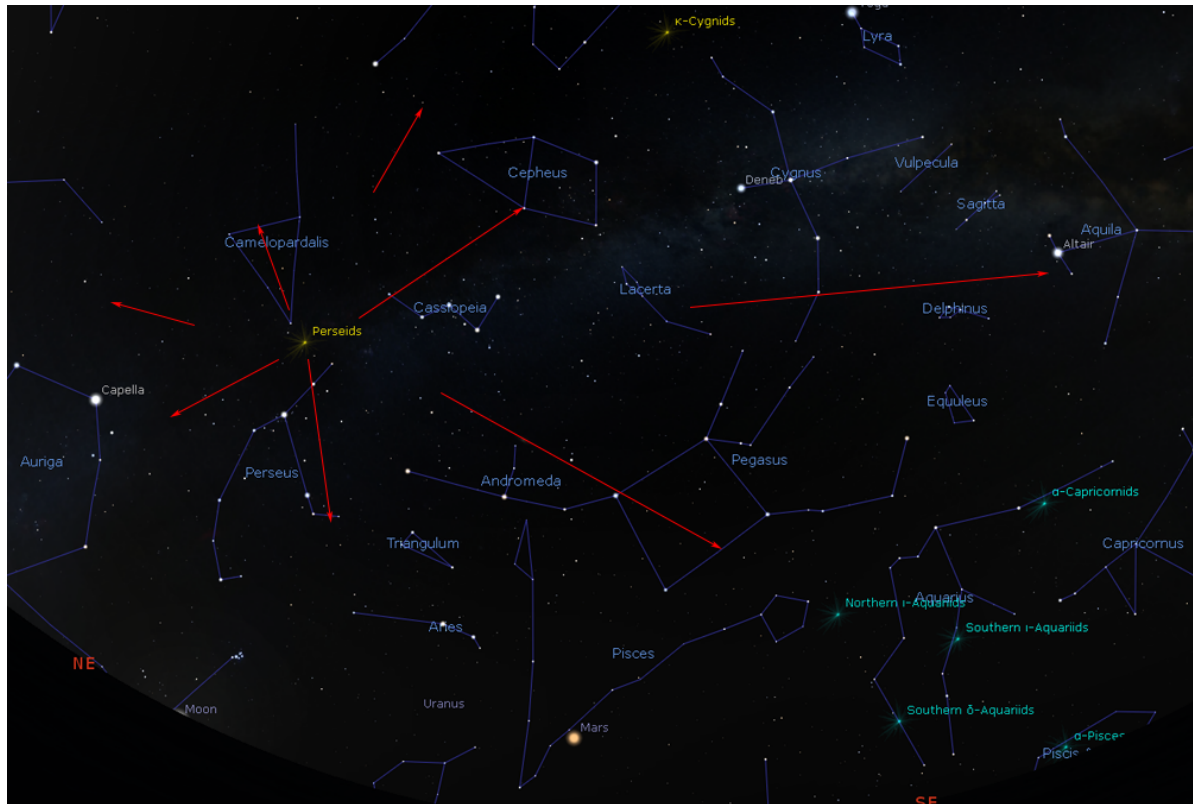
<https://youtube.com/watch?v=cnM7pfIQRHM>

Some of the software and websites mentioned in the video includes:

- [SIRIL](#)
- [Muniwin](#)
- [AstrolImageJ](#)
- [Aperture Photometry Tool](#)
- [SIMBAD](#)

Get ready for the Perseid meteor shower August 2020

26 July 2020



The Perseids, one of the best meteor showers of the year, coincides with a waning Moon in 2020 when the shower reaches its peak on the night of August 12-13, so conditions are quite favourable. Some will be visible each night from 23 July to 20 August.

The chart above shows the stars for midnight BST 12 – 13 August 2020

At its peak the shower is expected to produce a Zenith Hourly Rate (ZHR) of about 80 meteors per hour. From Edinburgh the radiant of the shower will be 38° above the NE horizon at midnight. This means we might be able to see around 50 meteors per hour, since the radiant will be relatively high in the sky. And remember, you can actually see some Perseids from as early as 23 July all the way up to the peak.

The Moon will rise just before midnight BST and is waning at 42% illumination, so conditions are pretty good.

The radiant is the point in the sky that the meteors appear to come from, which in this case is in the constellation of Perseus. To view meteors don't look directly at the radiant itself but at about $30-40^\circ$ away from it, then meteors will show reasonably long trails without being too spread out.



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Meteor showers happen when we pass through the debris left behind by comets and asteroids. The comet responsible for the Perseid shower is 109P/Swift–Tuttle and we pass through this cloud every year in Jul-Aug. When these tiny objects hit our atmosphere they burn up and appear as “shooting stars”.

Some useful times on 12 August 2020 (BST)

Sunset: 20:56

Nautical darkness: 22:41 – 03:54

Astronomical darkness: 00:23 – 02:22

Mark Phillips

Information source: in-the-sky.org



View our post on [observing and imaging meteors](#) »

Observing and imaging meteors

26 July 2020



You don't need anything other than a little patience to observe meteors. Just lie back in a reclining chair if you can (saves a lot of neck pain) and look up. The advice is usually to look about 30-40 degrees away from the radiant and about 60 degrees up to get a good chance of seeing more meteors. But remember meteors can appear in any part of the sky at any time. The closer to the radiant they are, the shorter the trails will be – further away trails appear longer.

To image meteors a camera on a fixed tripod is sufficient, preferably with a remote shutter release, but this is not essential as you can use the camera's delay timer. The length of exposure you can use without stars appearing to trail is dependent on the focal length of the lens you are using. A basic rule of thumb is to divide 500 by the focal length of the lens, and that gives you the exposure in seconds. For example, a 28mm focal length lens should be able to do 18 seconds without any significant trails showing. Work out what the best ISO is for your camera to make it as sensitive as possible without introducing too much noise. Something between 800 and 3200 should be fine.



Because stars are faint and small your auto-focus may not work well – or at all – so you will have to focus the camera manually. This is critical! There's no point spending an evening taking

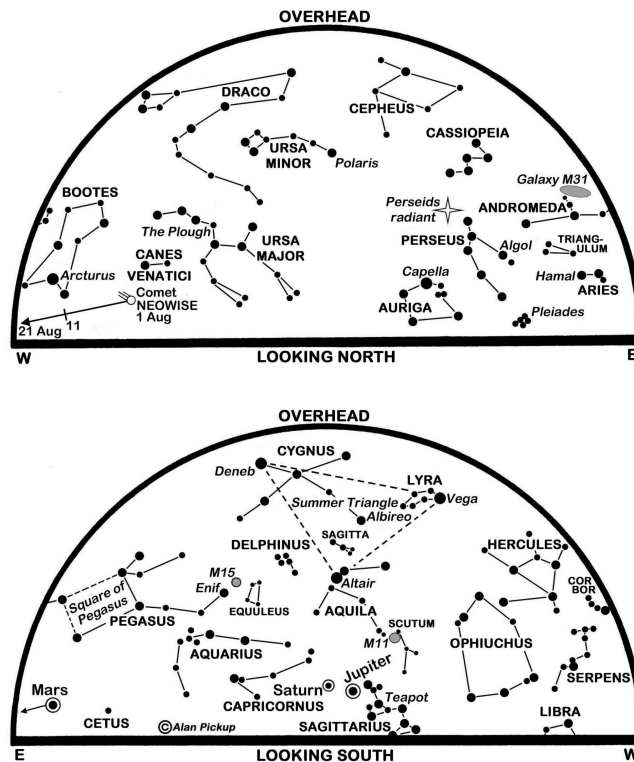
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hundreds of exposures only to find that all of them are blurred afterwards. Take some time over this to get it spot on. Here's a tutorial on [using Live View](#) to get the focus right.

If you manage to image or observe any meteors, please post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Scotland's Sky in August 2020

31 July 2020



Perseids meteor shower peaks as summer comet recedes



Author: [Alan Pickup](#)

The maps show the sky at midnight BST on the 1st, 23:00 on the 16th and 22:00 on the 31st. Arrows depict the motion of Mars and of Comet NEOWISE until the 21st.

After our summer twilight, August brings the return of truly dark nights that are rich in bright planets, enlivened by Perseids meteors and, for good measure, witness the retreat of our best comet in years.

The Summer Triangle, formed by the stars Deneb, Altair and Vega, occupies the high southern sky at our map times. It points down to Jupiter which outshines every star and lies in Sagittarius to the right of the Sun's other gas giant planet, Saturn. The familiar shape of the Plough stands in the north-west as Capella in Auriga twinkles low in the north-east, below and left of the constellation Perseus which, in turn, stands below the "W"-shaped Cassiopeia.

The Perseids shower is already underway as it builds to its expected peak on the 12th. This reliable shower of very swift meteors, many leaving glowing trains or streaks in their wake, yields 80 or more meteors per hour under ideal skies. Expect our best nights to be those of the 11th-12th and while the shower peters out by the 24th.

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As their names suggests, Perseid meteors emanate from a radiant point in Perseus which climbs from the north-east at nightfall to lie almost overhead at dawn. Although they appear in every part of the sky, Perseids appear to diverge from the radiant because of the effect of perspective. There is no need for a telescope – just sit back and enjoy the show, though please don't be disappointed if your meteor rate falls well short of the ideal. Should you find the waning Moon to be obtrusive, try to block it from your vision.

Our summer comet, Comet NEOWISE, is named for NASA's Wide-field Infrared Survey Explorer space telescope which discovered it in March. It was followed from Earth's southern hemisphere until it dived into the Sun's glare in June but there was speculation that it might be a naked-eye object when it remerged in our pre-dawn sky in July. There were also fears that, like the recent comets ATLAS and SWAN, it could fizzle and even disintegrate entirely.

I now regret that I didn't promote it a month ago, for in early July it rose before the Sun to give us a surprising and stunning cometary display. Easily visible to the unaided eye, it sported an upwards-pointing tail of dust alongside a dim bluish gas tail, best seen in photographs. Before long it became circumpolar, meaning that it remained above our horizon as the Earth's rotation carried it low across our northern sky from left to right overnight.

Studies suggest that its icy nucleus is 5km wide and that it last approached the Sun some 4,500 years ago. After benefiting from a gravitational boost by the planets, it will not return to our sky for perhaps another 6,800 years. Perihelion, when it was closest to the Sun at 44 million km, came on 3 July and it swept (safely!) 103 million km from the Earth on 23 July.

Now it is an evening object some 30° below the handle of the Plough in the north-west, but it is fading as it recedes from both the Sun and the Earth. Our northern star map plots its path, though I fear we may need binoculars to spot it as August begins, and it may be hard to see at all by the middle of the month. Attempts to anticipate its appearance, though, have been wrong before!

Sunrise/sunset times for Edinburgh change from 05:18/21:19 BST on the 1st to 06:16/20:09 on the 31st. Full moon on the 3rd is followed by last quarter on the 11th, new moon on the 19th and first quarter on the 25th.

Jupiter is obvious low in the south-east as our August nights begin and moves to pass 12° high in the south for Edinburgh at our map times. Weather permitting, it will be doubly hard to miss on the 1st when it stands 2.5° above the Moon, and the two are close again on the 28th. Saturn is less than a tenth as bright but easily seen 8° to the left of Jupiter.

The two were brightest and closest in July. Now they are beginning to fade and shrink as they recede, but both remain excellent subjects for telescopic study. By mid-August, Jupiter is magnitude -2.6 and its cloud-banded disk is 46 arcseconds wide, while Saturn is magnitude 0.2 and 18 arcseconds across. The Saturnian rings have their northern face tipped 22° towards us and span 41 arcseconds.

The night's third bright planet, Mars, rises in the east a little before our map times at present and is tracking slowly eastwards in Pisces, below and slightly left of the Square of Pegasus. Brightening from magnitude -1.1 to -1.8. its reddish light is becoming increasingly prominent high in our southern sky before dawn. Telescopically, it swells from 15 to 19 arcseconds making it more worthwhile as a target. Catch it close to the Moon on the morning of the 9th.

Venus now rises more than three hours before the Sun and is a dazzling morning object between the north-east and east. August sees it dim from magnitude -4.4 to -4.2 as its diameter shrinks from 27 to 20 arcseconds and the sunlit portion of its disk changes from 43% to 60%, from crescent to gibbous in phase. Look for it to the right of the slim earthlit Moon on the 16th.

Mercury, bright at magnitude -0.8, rises 95 minutes before the Sun on the 1st and may be glimpsed very low in our north-eastern twilight for a few more days before it sinks towards its superior conjunction on the Sun's far side on the 17th.

Diary for 2020 August. Times are BST.

- 2nd 01h Moon 1.5° S of Jupiter
- 2nd 14h Moon 2.3° S of Saturn
- 3rd 17h Full moon
- 9th 09h Moon 0.8° S of Mars
- 11th 18h Last quarter
- 12th 12h Moon 7° S of Pleiades
- 12th 14h Peak of Perseids meteor shower
- 13th 01h Venus furthest W of Sun (46°)
- 13th 12h Moon 4° N of Aldebaran
- 15th 13h Moon 4° N of Venus
- 17th 16h Mercury in superior conjunction
- 17th 19h Moon 2.0° N of Praesepe
- 19th 04h New moon
- 22nd 21h Moon 7° N of Spica
- 25th 19h First quarter
- 26th 06h Moon 6° N of Antares
- 29th 03h Moon 1.4° S of Jupiter
- 29th 18h Moon 2.2° S of Saturn

This is an extended version, with added diary, of Alan's article published in The Scotsman on 30 June 2020, with thanks to the newspaper for permission to republish here.

The Sky in August 2020 presentation

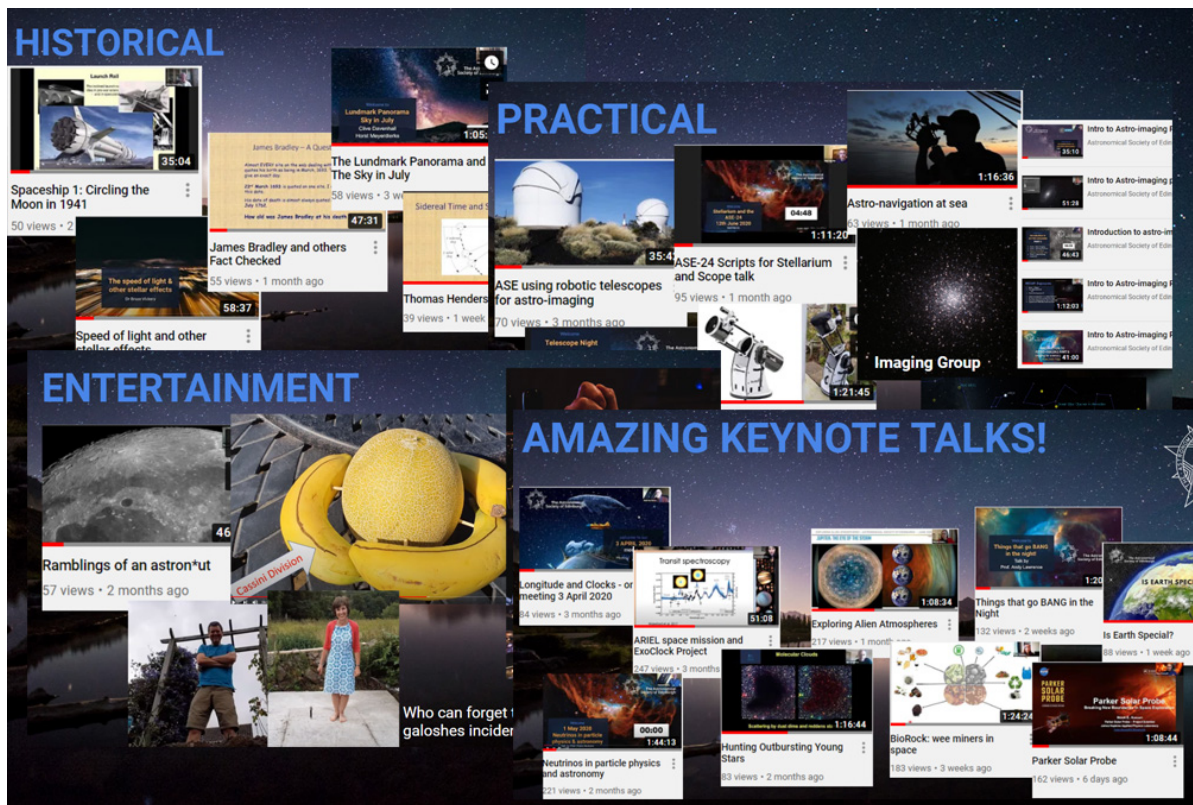
1 August 2020



ASE member Mark Phillips told us about the things to view in the night sky during August, including the [Perseids meteor shower](#), Mars and several objects in our [ASE-24 list](#).

End-of-term report

4 August 2020



The first part of our lockdown season of talks came to end on Friday and what an amazing time we've had. Featuring practical, historical, entertaining and superb keynote talks. A huge thank you to all our speakers, especially our guest speakers, who were prepared to do online talks for us.

In numbers:



Online events since 3 April



Membership increased to



Members on Zoom

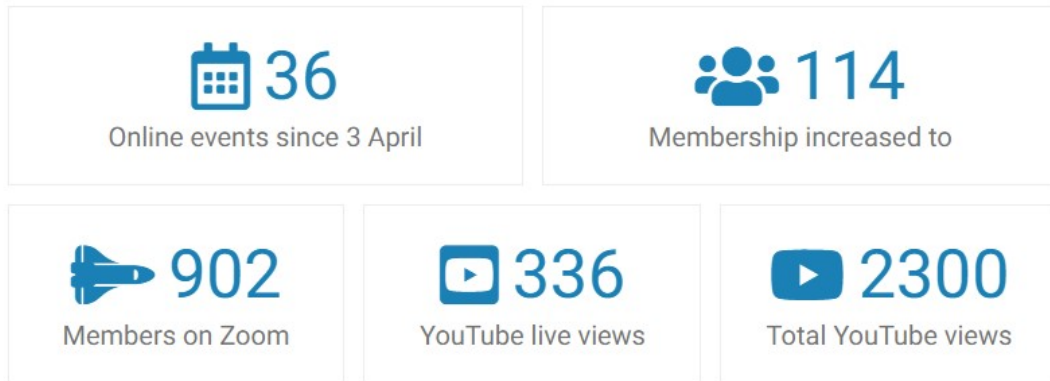


YouTube live views



Total YouTube views

Numbers are:



You can see most of the talks on our [YouTube channel](#).

A lot of time and effort went into this so a special thanks to everyone involved:

- Organising speakers
- Preparing & delivering talks
- Developing course content
- Managing and coordinating the programme
- Running online meetings
- Email / Website / Facebook / Twitter / Eventbrite

From September...

- Two main meetings per month – online still
- Normally Fridays – but could be other days
- Plus Imaging Group
- Plus other ad hoc meetings arranged
- More observing events – weather permitting

Talks included:

Practical:

- Using robotic telescopes
- Several scope talks
- ASE-24 scripts for Stellarium
- Astro-navigation at sea
- Imaging Groups
- Monthly sky guides
- Introduction to astro-imaging in 5 parts

Entertainment:

- Ramblings of an astro-n*ut
- Concrete galoshes
- Virtual pub quiz

Keynote talks:

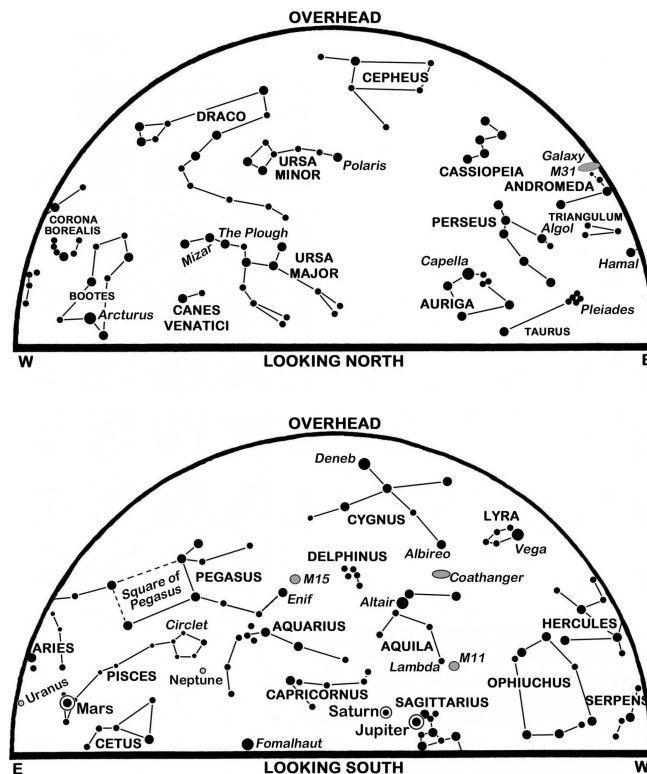
- Longitude and clocks
- Neutrinos and particle physics

Historical:

- Spaceship 1
- Speed of light and other stellar effects
- James Bradley
- The Lundmark Panorama
- Thomas Henderson
- Reflections on spaceflight
- Ariel and ExoClock
- Hunting Outbursting Young Stars
- Exploring Alien Atmospheres
- BioRock: wee miners in space
- Things that go BANG in the night
- Is Earth special?
- Parker Solar Probe

Scotland's Sky in September 2020

31 August 2020



Mars grows in prominence as the Mars-fleet departs



Author: [Alan Pickup](#)

The maps show the sky at 23:00 BST on the 1st, 22:00 on the 16th and 21:00 on the 30th.

Some clear nights would make for a pleasant change, although our sky at nightfall is itself altering only slowly. Jupiter, always brighter than any star, stands alongside Saturn low in the south while above them looms the large Summer Triangle, formed by Vega, Deneb and Altair, the leading stars in the constellations Lyra, Cygnus and Aquila respectively.

By our map times, the Summer Triangle is toppling westwards as it gives way to the smaller Square of Pegasus, climbing in the south-east. Whereas the Triangle is awash with stellar interest, the Square is relatively barren and may appear empty of stars under moonlit or light-polluted skies – indeed, some observers use the number of stars they can count within it as a test of the sky's darkness and clarity.

A third planet, Mars, lies below the Square and is growing ever more prominent as it approaches its nearest point to the Earth and opposition in October. It will then be 62 million km away, making it closer and brighter than it will be again until 2035. To take advantage of the optimum time to

on the journey, September has seen the successful launch of three new missions to the Red Planet – the UAE's Hope orbiter, China's Tianwen-1 orbiter, lander and rover and NASA's Perseverance rover – all seem to be going well and all are due to arrive next February.

Mars rises in the east before our evening twilight has faded and it climbs through the south-east to pass more than 40° high on Edinburgh's meridian before dawn. It surpasses Jupiter in brightness this month as it improves from magnitude -1.8 to -2.5. Swelling in diameter from 19 to 22 arcseconds, it is large enough for telescopes to show dusky marking on its rusty surface, along with its white southern polar ice cap which is tipped 18° towards us at present.

As Mars begins to be overtaken by the Earth, it slows to a stationary point against the stars of Pisces on the 9th when its motion reverses from easterly to westerly. The planet lies 3° left of the Moon on the evening of the 5th and is an impressive sight less than a degree above the Moon as that night ends.

Jupiter dims only slightly this month from magnitude -2.6 to -2.4 and lies in Sagittarius where it, too, is stationary on the 13th, although this time for its progress to switch from westerly to easterly. Saturn is 8° to Jupiter's left, rather fainter at magnitude 0.3 to 0.5 and itself stationary on the 29th. Look out for the Moon below-right of Jupiter on the 24th and below Saturn on the 25th.

A telescope shows the four main moons of Jupiter to either side of its cloud-striped globe, around twice as wide as Mars and 42 arcseconds across in mid-month. Saturn's rings have their north face tipped 23° towards us and span 40 arcseconds around the planet's 18 arcseconds wide globe.

The Sun travels 11.5° southwards during September to cross the equator at our autumnal equinox at 14:31 BST on the 22nd. Edinburgh's sunrise/sunset times change from 06:18/20:06 BST on the 1st to 07:14/18:50 on the 30th. The Moon is full on the 2nd, at last quarter on the 10th, new on the 17th, at first quarter on the 24th and full again on 1 October, which, since it is the full moon closest to the equinox, will make it 2020's Harvest Moon.

Neptune, visible through binoculars at magnitude 7.8 in Aquarius, reaches opposition at a range of 4,327m km on the 11th while Uranus, in Aries and around 13° east of Mars, is a little brighter at magnitude 5.7. Venus, in contrast, blazes as a magnitude -4.1 morning star in the east for four hours before sunrise. Now showing a dazzling gibbous disk through a telescope, it is 17 arcseconds wide, 65% sunlit and 4° below-right of the waning earthlit Moon on the 14th, with the Praesepe star cluster in Cancer within the same binocular view.

The Milky Way, the merged light of countless dim and distant stars in the plane of our Galaxy, arches overhead at our map times as it flows from Sagittarius and Scorpius on the south-western horizon to Auriga low in the north-east. On its way, it passes through the Summer Triangle and close to Deneb before plunging down through Cepheus, Cassiopeia and Perseus. If we wait until the Moon is out of the way, and can escape the blight of street lights, then binoculars reveal numerous fainter stars along it, some of them double or grouped into clusters.

One such cluster is Messier 11, or M11, which lies below and right Aquila in the minor constellation of Scutum the Shield. We can find it 4° west of Lambda Aquilae (see chart) where binoculars show it as a hazy mass about half as wide as the Moon. Telescopes reveal its brighter component stars, some of them in a V-formation which has led to its popular name of the Wind Duck Cluster from their likeness to a flock of flying ducks. M11 is some 6,000 light years distant and contains thousands of stars that formed together about 300 million years ago.

Another attractive target is the so-called Coathanger, a pattern of stars 1.5° wide that resembles an upside-down coat-hanger. Easily found using binoculars, it lies about one third of the way from Altair to Vega and, like M11, is very close to the centre-line of the Milky Way. Just 8° north of it is Albireo, the star at Cygnus' beak. A small telescope or good binoculars show it as a striking double star, composed of contrasting orange and blue-green components.

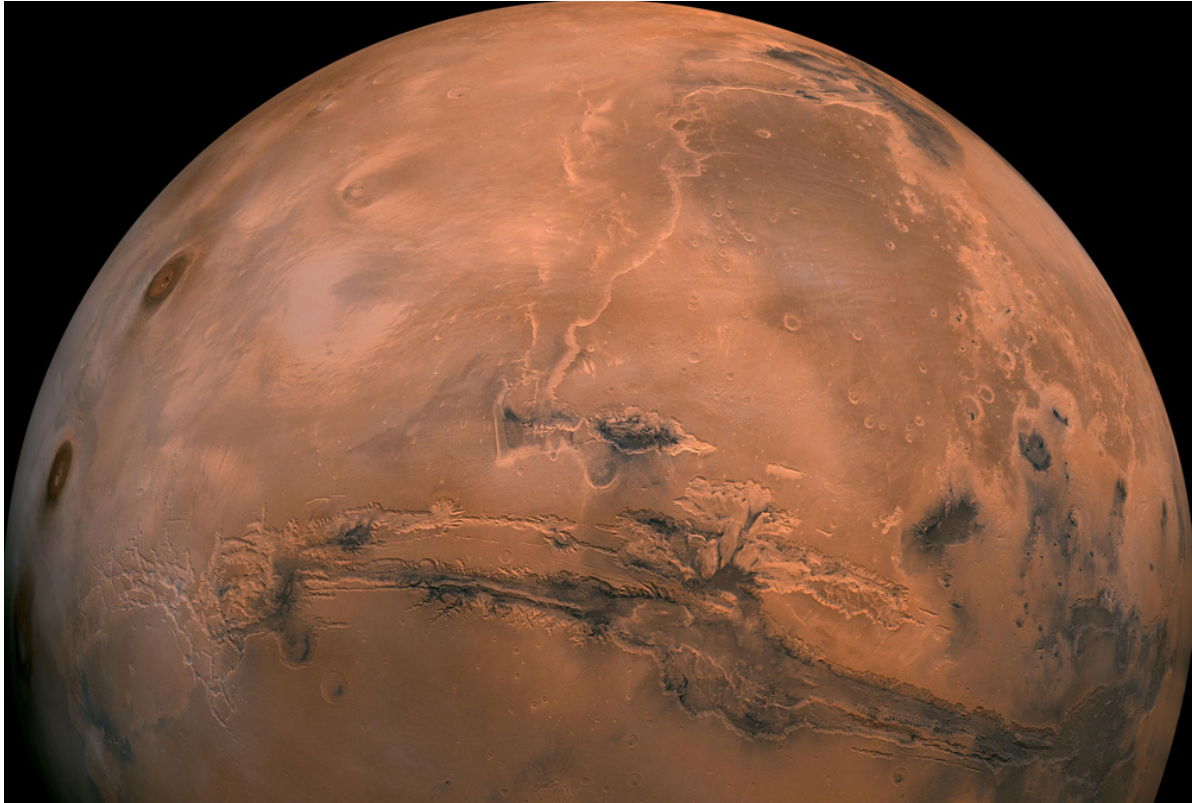
Diary for 2020 September. Times are BST

- 2nd 06h Full moon
- 6th 06h Moon 0.03° N of Mars
- 8th 20h Moon 6° S of Pleiades
- 9th 19h Mars stationary (motion reverses from E to W)
- 9th 20h Moon 4° N of Aldebaran
- 10th 10h Last quarter
- 11th 21h Neptune at opposition at distance of 4,327m km
- 13th 01h Jupiter stationary (motion reverses from W to E)
- 13th 17h Venus 2.3° S of Praesepe
- 14th 05h Moon 2.2° N of Praesepe
- 14th 06h Moon 4° N of Venus
- 15th 17h Moon 4° N of Regulus
- 17th 12h New moon
- 22nd 12h Moon 6° N of Antares
- 22nd 14:31 Autumnal equinox
- 24th 03h First quarter
- 25th 08h Moon 1.6° S of Jupiter
- 25th 22h Moon 2.3° S of Saturn
- 29th 04h Saturn stationary (motion reverses from W to E)

This is an extended version, with added diary, of Alan's article published in The Scotsman on August 31 2020, with thanks to the newspaper for permission to republish here.

Get ready for Mars 2020

31 August 2020

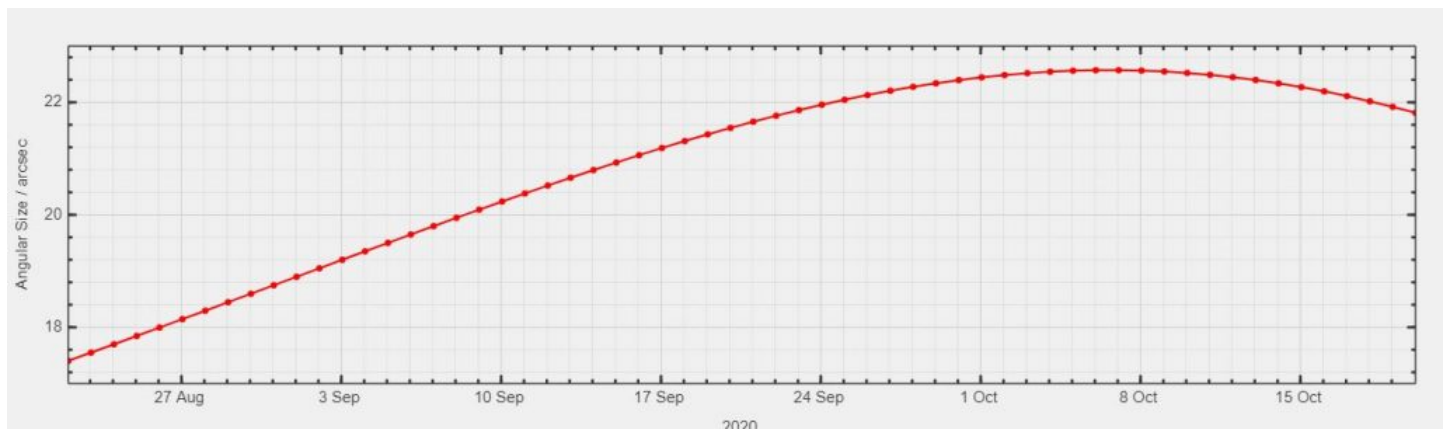


For most of the rest of 2020 Mars is going to be a prominent evening object and the best placed planet to observe, so don't miss out on seeing it at this favourable apparition.

Mars has always fascinated observers because it is so close, has an atmosphere and has seemed the most likely planet in our solar system to harbour some form of life. Three missions are already on their way to Mars, launched in July, but "...the chances of anything coming from Mars are a million to one...."! Anyway, enough of the science fiction, how can we observe or image it?

Mars never approaches the same size that gas giant Jupiter does (46.9") but this year it will be a pretty decent size for the planet, reaching 22.6 arcseconds and a magnitude of -2.6 at its closest point to Earth on 6 October. In 2020 Jupiter and Saturn have been very low in our skies making them very difficult to observe through many layers of atmosphere, but Mars will be much higher, up to 42 degrees, making it much easier to observe. Keep an eye on [Alan Pickup's Sky Diaries](#) over the next few months for updates.

Here's a graph showing how the planet's apparent angular size changes over the next few months.



Graph from in-the-sky.org

Visual Observing

You'll need to use a higher magnification (as much as your telescope will allow given the seeing conditions) to see much on Mars but even through a small telescope (70 – 100mm aperture) you should be able to make out some dark markings and maybe even the south polar cap, although that may shrink to be quite small as the planet is closer to the Sun. Interestingly, to make it appear in a telescope the same size as the full Moon seen with the naked eye requires a magnification of only about 80x, although you'll probably want more than that.

To make out much visually you'll need a larger aperture and good seeing conditions – not something we get a lot of in Scotland. Seeing is the steadiness of the atmosphere and when unsteady the image will appear to boil in the eyepiece and jump about all over the place. But even then there may be fleeting moments of calm where you can make out some of the features. Drawing a planet is a good way to increase your skills as an observer and over time you'll actually learn to see more details this way. There's an interesting and useful article about [drawing planets on the BAA website](#) and a useful [Mars Mapping Tool](#) to let you know what it is you might see.

Imaging Mars

You can image Mars in a number of ways:

- Simple snaps of Mars from a fixed tripod with a zoom lens (as some ASE members have done). It will be difficult to make out any details this way but can capture Mars as a tiny disc.
- Single shots through the eyepiece of a telescope, maybe even with your smartphone camera. This is called afocal imaging and uses the eyepiece to magnify the image. Some form of [adaptor](#) or [phone holder](#) makes a huge difference when trying to align the camera and eyepiece. This relies on taking an image during one of those steady moments.
- But the best way is high frame-rate video capture, sometimes called "lucky imaging".

Using a relatively inexpensive camera (e.g. [ZWO ASI 224mc](#)) you can capture a video of Mars for say 120s at a frame rate of maybe 60 to 120 frames-per-second and that will allow you to capture brief moments of calm when the details of the planet are visible. You then process the video using [AutoStakkert](#), for frame selection and stacking, and then [Registax](#) for sharpening using wavelets. You

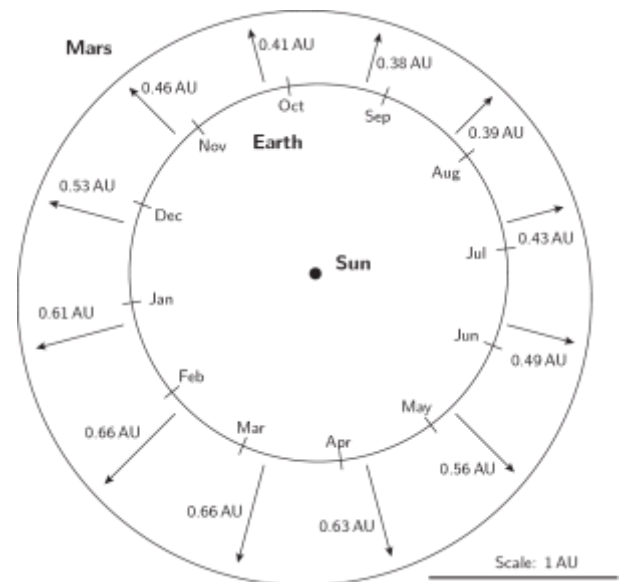
can get some amazing results this way and we are already seeing some [superb pictures from amateurs](#). You can find out more about this sort of imaging in our [Introduction to Astro-imaging Course: Part 3](#).

A device that has become popular recently and more affordable is an [ADC: Atmospheric Dispersion Corrector](#). This is an optical device that reduces the amount of *smearing* caused by our atmosphere, especially at low altitudes, providing a sharper image.

If you want to study Mars more seriously then you could join the [Mars Section of the BAA](#).

Why is this a good apparition?

Earth's orbit is very circular in comparison to Mars which has an oval shaped, elliptical orbit, as you can see from this drawing. The Earth-Sun distance only changes by about 3% over a year but for Mars that's more like 20%. So when oppositions occur during August to October, you can see that Mars is much closer to the Earth and therefore bigger and brighter in our night sky. In fact at this time of year it can appear up to 60% larger than at a March opposition. This year Mars reaches perigee (closest point to Earth) on 6 October, so it is a good apparition. Perigee and opposition are different: opposition occurs when Mars is directly opposite the Sun as seen from Earth and this is on 14 October in 2020.



Article: Mark Phillips

Main image credit: NASA/JPL-Caltech

Other images and information: Dominic Ford in-the-sky.org

[BAA website](#)

Fast Radio Bursts talk and meeting report

5 September 2020



We had an fascinating talk Professor Duncan Lorimer live from West Virginia on Zoom and YouTube about Fast Radio Bursts.

Talk video: <https://www.youtube.com/embed/d3ayyhxIMMY>

We had a really international audience including visitors from India and Texas, USA. There were a few News updates as well as information from Sean about our upcoming AGM:

- Friday 2 October 2020 7:30pm via Zoom
- Ask as many members as possible to attend
- We will be voting remotely
- We need to approve the draft annual report and accounts of the Society
- We need to approve the draft minutes of the 2019 AGM
- We need to elect Office Bearers and Members of the Council (11 in total)
- Elect 5 Officers (President, 2 Vice President's, Secretary and Treasurer) and elect 6 Councillors
- Hold office till the 2021 AGM
- Any member can nominate another member for Council. Nomination must be seconded by a different member
- Nominations/seconding must be in writing to the Secretary email: [secretary @ astronomyedinburgh.org](mailto:secretary@astronomyedinburgh.org)
- NOMINATION DEADLINE: Friday 11 September 2020 (21 days before AGM)

We also had the Sky in September from Alan Pickup.

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Talk synopsis:

Fast Radio Bursts are millisecond-duration pulses of unknown origin that were discovered by an undergraduate student at West Virginia University in 2007. A decade on, with over 100 further bursts currently known, fast radio bursts remain enigmatic sources which parallel the early days of gamma-ray burst astronomy in the early 1970s. I will tell the story of their discovery, summarize what we know about them so far, describe the science opportunities these bursts present, and make predictions for what we might learn in the next decade.

Imaging & Observing Group

5 September 2020



At our recent September meeting we announced that the Imaging Group would become the Imaging & Observing Group (IOG). This is not a change of focus but to more accurately reflect what we do and be as inclusive as possible.

The IOG is probably the most active part of the Society and as well as imaging we take about many other astronomical topics including observational techniques, equipment, software, clear sky forecasts and many other topics. We often enjoy live virtual observing events where members chat through WhatsApp while they are outside making observations and imaging. You can sometimes find yourself chatting to someone observing the Moon or a planet at 2am! We've also done a few EAA (Electronically Assisted Astronomy – quick imaging) live stream sessions using Zoom.

We want the group to be as inclusive as possible to allow all active amateurs to learn from each other as we have been doing through our imaging activities. So please join us for our monthly meetings and join our WhatsApp group by using the invitation link on the [Members website](#). And if you're not a member but would like to be part of this group then consider joining the Society to take part. It's a fun place to be.

As lockdown eases we hope to be able to have some socially distanced physical observing too, at Newbattle Abbey and other locations. So being part of the group communication can

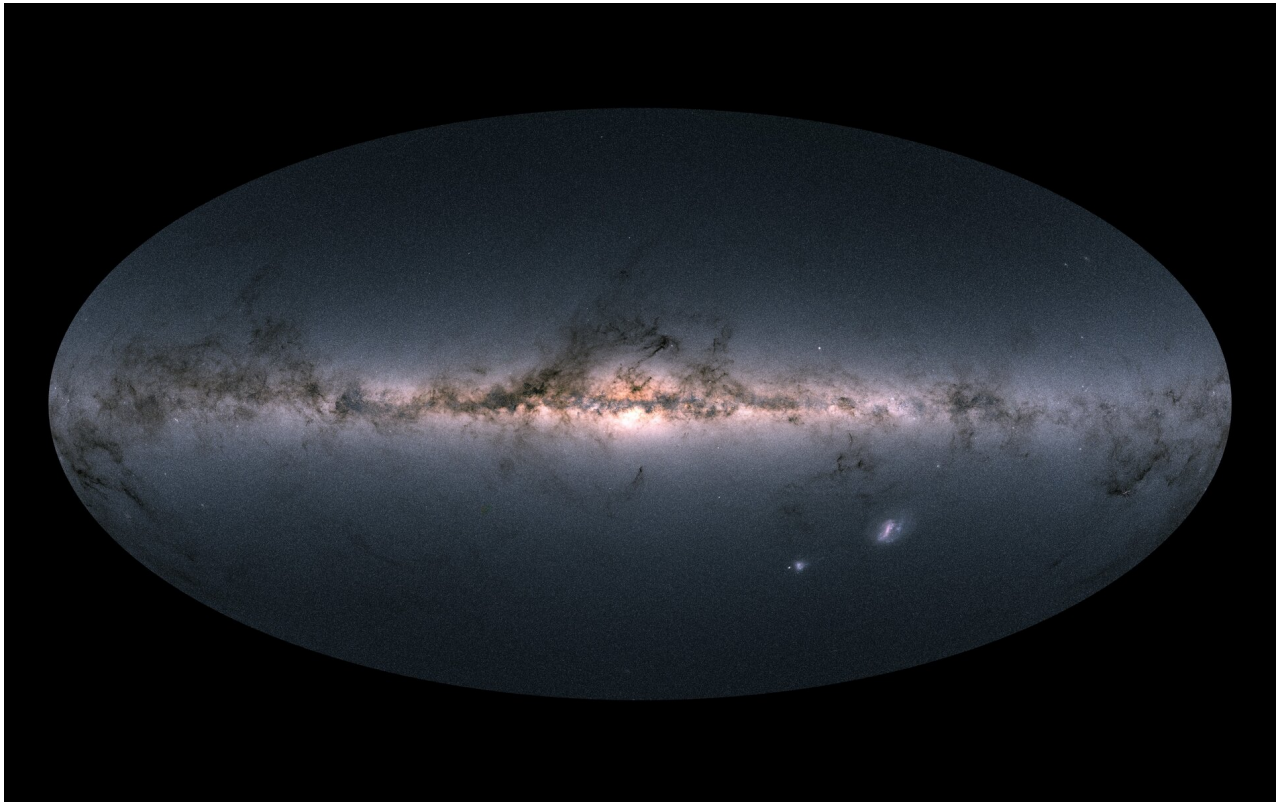
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find out about these events, which will undoubtedly be arranged at the last minute to allow for the weather.

The page on our website has been updated to reflect the change to [Imaging & Observing Group](#).

18 Sept 2020 meeting report

20 September 2020



ASE member John Murrell gave us a fascinating insight into the Gaia second data release.

John provided us with the links to the videos & Animations plus the tools. He also included a few other links that people may find of interest and there is a lot of material on the web both about the mission and the results.

YouTube video link:

https://www.youtube.com/watch?v=IK3z_pxltHU

From John:

Links to the videos and animations in my talk

More information on the mission than I gave: <https://directory.eoportal.org/web/eoportal/satellite-missions/content/-/article/gaia-satellite-mission>

General Gaia Information including latest results

<https://sci.esa.int/web/gaia>

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Bending of light by solar system planets

<https://www.cosmos.esa.int/web/gaia/media-gallery/videos> scroll down to @Light Bending in the Solar System

There is also some information on the Gaia Scanning law I did not cover.

The two movies below are also on this page with a description

First Gaia General Video

http://wpc.50e6.edgecastcdn.net/8050E6/mmedia-http/download/public/videos/2013/12/036/1312_036_AR_EN.mp4

Second Gaia Video

https://www.cosmos.esa.int/documents/29201/304538/Gaia_SkyScan_04_400p.mov/6a3f29f5-4c3a-4a16-bc68-75948884c9c1

Variable Star colours in the Gaia HR Diagram (page has the animation embedded in it)

<https://sci.esa.int/web/gaia/-/60239-variable-stars-in-the-hertzprung-russell-diagram>

Parallax & Proper motion Animation

<https://www.youtube.com/watch?v=KyQdK56Qee0&list=PLbyvawxScNbtfaJAmFlrnzdE0d32GNidK&index=10&t=0s>

GaiaSky Documentation & download instructions

https://gaia-sky.readthedocs.io/_/downloads/en/2.2.1/pdf/

ESA Sky

<https://sky.esa.int/?target=315.3727708333333%2016.18791388888889&hips=DSS2+color&fov=0.2009037255403502>

Aladin Sky Atlas

<https://aladin.u-strasbg.fr/>

TOPCAT

<http://www.star.bris.ac.uk/~mbt/topcat/>

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Gerry Gilmore's RAS lecture on 'Gaia the 6D Milky Way is coming to you' (DR1)

<https://www.youtube.com/watch?v=8KepdLqBibw>

YouTube ESA Gaia videos [https://www.youtube.com/playlist?](https://www.youtube.com/playlist?list=PLbyvawxScNbtfaJAmFlrnzdE0d32GNidK)

[list=PLbyvawxScNbtfaJAmFlrnzdE0d32GNidK](https://www.youtube.com/playlist?list=PLbyvawxScNbtfaJAmFlrnzdE0d32GNidK)

Useful DR2 Guide

<https://www.cosmos.esa.int/documents/29201/1773953/Gaia+DR2+primer+version+1.3.pdf/a445976732-7a98-1406-a1bea243df79?t=1581668739161>

Gaia Alerts (I spoke of these but they were not in the presentation)

<http://gsaweb.ast.cam.ac.uk/alerts/home>

All sorts of strange light curves in this list – includes micro-lensing, binary stars, YSO's with evidence of periodicity, Super Novae, Etc

International Observe the Moon Night 2020 live stream

27 September 2020



Thank you to everyone who joined us for the live stream on International Observe the Moon Night 2020. You can watch the video on YouTube.

Because the Moon was so low at our latitude, we decided to look at some other objects as well and managed to see:

- Saturn
- Jupiter
- Double star Albireo
- Globular cluster M15
- Dumbell Nebula M27
- Andromeda galaxy M31
- Double cluster H and Chi Persei
- Open cluster M34

If you want to find out more about observing these sorts of objects have a look at our [ASE-24 Observing List for Beginners](#)

We do plan to do more live streams over the next few months, including looking at Mars which is bright and well placed at the moment.

YouTube video



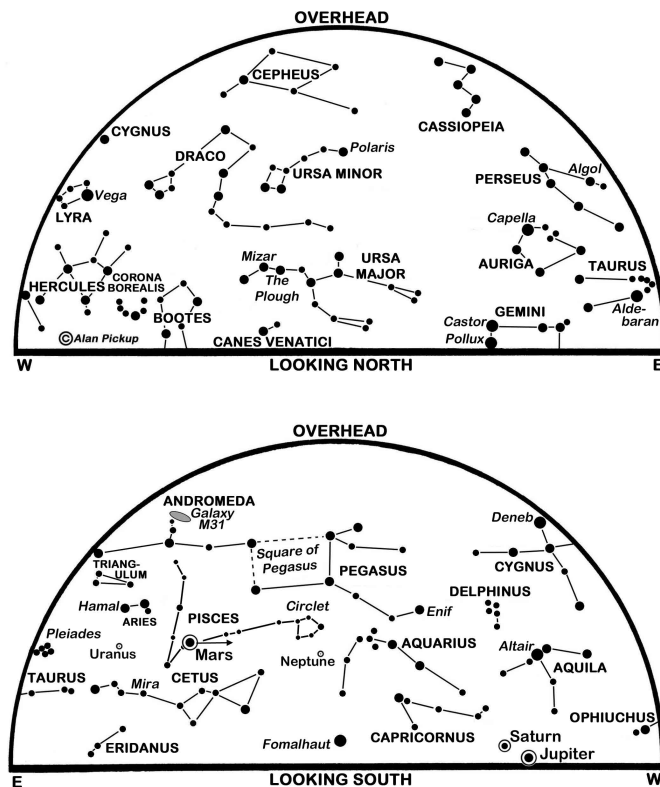
International Observe the Moon Night 2020

https://youtube.com/watch?v=aVCR8JEFJ_0



Scotland's Sky in October 2020

30 September 2020



Mars at its best alongside the Harvest Moon



Author: [Alan Pickup](#)

The maps show the sky at 23:00 BST on the 1st, 22:00 BST (21:00 GMT) on the 16th and at 20:00 GMT on the 31st. An arrow depicts the motion of Mars. Summer time ends at 02:00 BST on the 25th when clocks are set back one hour to 01:00 GMT.

Mars is about to reach opposition and is the undoubted star of our October nights. Now at its brightest and best for observation from Scotland, it stands in the east as darkness falls and climbs to blaze like an orange beacon the heart of our southern sky a few hours later. Jupiter continues as a prominent object low in the south at nightfall, while Saturn lies to Jupiter's left and Venus is glaringly obvious in the east before dawn.

The full moon on the 1st, being the one closest to our autumnal equinox on 22 September, is this year's Harvest Moon. This traditional name comes from the fact that its nightly motion makes only a shallow angle with our eastern horizon over several evenings, meaning it can illuminate our harvesting toils well into the night. Look for it well to the right of Mars on the 1st and 4° to the right of the planet on the next evening. The two make an impressive sight that night, drawing to within 1.2° as they sink in our western sky before dawn on the 3rd. They meet again on the 29th when the 3.5° below Mars as they climb in the east.

Mars' opposition comes on the 14th when it shines at magnitude -2.6 and lies opposite the Sun in the sky so that it rises at sunset and stands almost 40° high in the south at 01:00 BST. Appearing to track 9° west-south-westwards against the dim stars of Pisces, it is also edging outwards from the Sun in its orbit, so it is actually closest to us at 62 million km on the 6th when it appears 22.6 arcseconds wide if viewed through a telescope. By the 31st, Mars has dimmed to magnitude -2.1 and contracted to 20 arcseconds in diameter.

This opposition brings Mars closer than it will be again until 2035, but not as near as the 58 million km it reached in the summer of 2018. It is much better from our viewpoint, though – back then it was in the grip of a dust storm which hid much of its surface detail, and its location some 30° further south in the sky made it poorly placed for study.

The southern hemisphere of Mars is tipped at about 20° to our view and its southern polar cap appears as a small white button, much smaller than a few months ago because expanses of its frozen carbon dioxide ice have disappeared, subliming away under the warmth of that hemisphere's summer. Elsewhere on the rusty iron-rich Martian surface, dark and light markings once thought to be seas and continents are now recognised as regions of rocky highlands and dusty low-lying plains.

The Sun sinks 11° southwards during October, causing our sunrise/sunset times for Edinburgh to change from 07:16/18:47 BST (equivalent to 06:16/17:47 GMT) on the 1st to 07:18/16:34 GMT on the 31st. We revert from BST to GMT at 02:00 BST on the 25th when our clocks are set back one hour to 01:00 GMT.

Tomorrow's full/Harvest Moon is followed by last quarter on the 10th, new moon on the 16th, first quarter on the 23rd and full moon again on the 31st, which tradition calls the Hunter's Moon.

Although the Summer Triangle formed by Vega, Deneb and Altair is still well placed high in our southern sky at nightfall it has moved into the west by our map times. Meanwhile, the Plough, part of the large constellation of Ursa Major, is rotating to the right below Polaris, the Pole Star, in the north and the "W"-pattern of Cassiopeia is nearing the zenith.

Below the Square of Pegasus, approaching the meridian in the south, is the so-called Circlet of middling stars that represent one of the two fish of Pisces while 10° below the Circlet and near the eastern edge of Aquarius is the binocular brightness (magnitude 7.8) farthest planet Neptune. The next most remote planet, Uranus, lies in Aries to the other side of Pisces and Mars and reaches its own opposition at a distance of 2,811 million km on the 31st. At magnitude 5.7, it is near the limit of naked-eye visibility but relatively easy to spot in binoculars given a better chart.

Jupiter, conspicuous at magnitude -2.4, stands less than 12° high in the south as darkness falls, but is setting in the south-west by our map times. Saturn, fainter at magnitude 0.5, lies 7° to the left of Jupiter at present but the gap between them shrinks to 5° by the month's end as both worlds creep eastwards in the constellation Sagittarius. Catch the Moon below Jupiter on the 22nd.

As Mars meets the Moon on the morning of the 3rd, there is a very close conjunction on the opposite side of the sky involving the dazzling morning planet Venus and Leo's leading star, Regulus. Venus shines at magnitude -4.1 and rises in the east-north-east some four hours before sunrise. Speeding eastwards through Leo, it is caught by the waning earthlit Moon in another spectacular conjunction on the morning of the 14th.

The Orionids meteor shower is active for much of October but may be best around the 22nd when perhaps 20 meteors per hour, and occasionally many more, may be glimpsed in our Moon-free morning sky. Like May's Eta Aquarids shower, its meteoroids come from Comet Halley. These disintegrate as they enter the atmosphere at 66 km per second and, although they appear in all parts of the sky, perspective means they diverge from a radiant point in north-eastern Orion, above-left of Betelgeuse.

Diary for 2020 October. Times are BST

- Times are BST until the 25th, then GMT
- 1st 17h Mercury furthest E of Sun (26°)
- 1st 22h Full moon (Harvest Moon)
- 3rd 01h Venus 0.1° S of Regulus
- 3rd 04h Moon 0.7° S of Mars
- 6th 03h Moon 6° S of Pleiades
- 6th 15h Mars closest to Earth (62m km)
- 7th 03h Moon 4° N of Aldebaran
- 8th 13h Peak of Draconids meteor shower
- 10th 02h Last quarter
- 11th 14h Moon 2.4° N of Praesepe
- 13th 03h Moon 4° N of Regulus
- 14th 00h Mars at opposition at distance of 63m km
- 14th 01h Moon 4° N of Venus
- 16th 21h New moon
- 19th 21h Moon 6° N of Antares
- 21st-22nd Peak of Orionids meteor shower
- 22nd 18h Moon 2.0° S of Jupiter
- 23rd 05h Moon 2.6° S of Saturn
- 23rd 14h First quarter
- 25th 02h BST = 01h GMT end of British Summer Time
- 25th 18h Mercury in inferior conjunction
- 29th 16h Moon 3° S of Mars
- 31st 15h Full moon (Hunter's Moon)
- 31st 16h Uranus at opposition at distance of 2,811m km

This is an extended version, with added diary, of Alan's article published in The Scotsman on September 30 2020, with thanks to the newspaper for permission to republish here.

Choosing a telescope

18 October 2020



Mark Phillips gave us a talk on what to consider when choosing a telescope as well as examples of different types and options.

This video will be useful alongside the post on [Buying a telescope for Christmas](#) and is part of our [4 Steps to the Stars](#) programme.

The [slides are available as a PDF](#) which you may find useful or reference purposes.

You can find astronomy suppliers on our [links page](#). The ones mentioned in the talk and used for demo purposes were:

- First Light Optics
- Rother Valley Optics
- Viking Optical (binoculars)

These are examples, there are other good ones.

Here are some useful links from the talk for 2nd hand equipment:



[Download the slides as a PDF](#)

<https://www.astrobuysell.com/uk/propview.php>

<https://stargazerslounge.com/forum/217-for-sale-swap>

<https://www.wexphotovideo.com/used> – sold with a guarantee

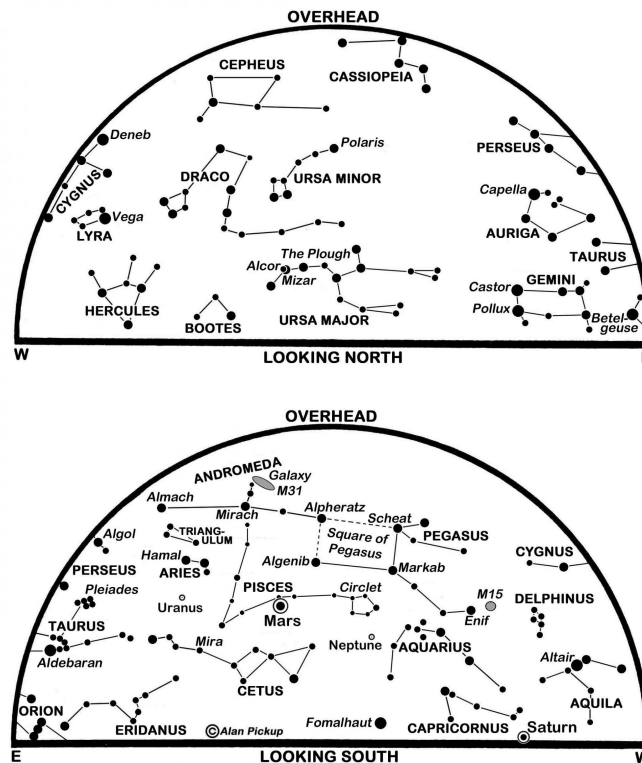
<https://www.ebay.co.uk>

<https://www.gumtree.com> – a bit of a wild card

Astroboot – cheap bits and pieces <https://www.astroboot.co.uk/AstroBoot>

Scotland's Sky in November 2020

31 October 2020



All planets visible, but the smallest steal the show



Author: [Alan Pickup](#)

The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 30th.

Seven planets are on view in November's night sky, but it is the two smallest, Mars and Mercury, that may be of the greatest interest.

Following its opposition on 14 October, Mars is now fading and receding but it remains a prominent and enticing object as it climbs from the east at nightfall to dominate the southern sky by our map times and cross the meridian some 90 minutes later.

More than halving in brightness from magnitude -2.1 on the 1st to -1.1 on the 30th, Mars' distance grows from 70 million to 96 million km. It sits well to the right of the Moon (the Hunter's Moon) on 30 September and much closer to the Moon on the night of the 25th. Now moving slowly in Pisces, it reaches a stationary point on the 25th when its progress reverses from westerly to easterly.

Telescope users will be eager to glimpse its surface features before its small ochre disk grows much smaller – this month it shrinks from 20 to 15 arcseconds in diameter. Telescopes or binoculars provide a better chart than I can provide here, let us spot the two outermost planets, Uranus and Neptune, which lie to the east and west of Mars and shine at magnitude 5.7 and 7.8 respectively.

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The normally-elusive Mercury is on the verge of its year's best appearance in our morning twilight. Between the 3rd and the 10th, when it stands furthest west of the Sun (19°), it triples in brightness from magnitude 0.7 to -0.5 and its altitude in the east-south-east one hour before sunrise grows from 5° to 8° . The tiny innermost planet improves a little further to magnitude -0.7 but falls slowly back into the twilight until it rises only one hour before the Sun by the 30th.

To the right of Mercury is Virgo's brightest star, Spica, while still higher and to the right is the brilliant (magnitude -4.0) Venus. Venus-rise for Edinburgh changes from 03:49 GMT on the 1st to 05:29 on the 30th, while its height above our south-eastern horizon at sunrise drops from 26° to 17° . Have your camera ready for an impressive sight on the morning of the 13th when the slender earthlit Moon lies 5° below-left of Venus and 8° above-right of Mercury.

Edinburgh's sunrise/sunset times change from 07:20/16:31 on the 1st to 08:18/15:44 on the 30th. The Moon is at last quarter on the 8th, new on the 15th and at first quarter on the 22nd. The full moon on the morning of the 30th brings the last of 2020's four penumbral lunar eclipses as the Moon slips through the southern fringe of the Earth's shadow in space. Observers across North America may see a little darkening of the Moon's northern part, but moonset occurs too soon after the start of the eclipse for anything to be noticed from Scotland.

Our nights still begin with the Summer Triangle of bright stars, Vega, Deneb and Altair, high in the south. Shining brightly at magnitude -2.2 to -2.0 below the Triangle is Jupiter, but, since it is barely 11° high for Edinburgh, we need an unobstructed view to the south-south-west to see it or its fainter neighbour Saturn, magnitude 0.6, which stands above and to its left.

Both planets are tracking eastwards (to the left) against the stars of Sagittarius, the gap between them shrinking from 5° on the 1st to only 2.3° by the 30th – by 21 December they are destined to converge to a mere 0.1° . Catch the young Moon below-left of the two on the 19th.

By our star map times, the two giant planets are setting in the south-west and the Summer Triangle has toppled into the west. Above and to the right of Mars in the south is the Square of Pegasus whose upper-left star, Alpheratz, belongs to Andromeda. The latter's other main stars, Mirach and Almach, stand level with Alpheratz to its left, while a spur of lesser stars above Mirach leads to the oval glow of the Andromeda Galaxy. Often called Messier 31 or M31, this is the sister spiral galaxy to our own Milky Way and, at its distance of 2.5 million light years, is often held to be the most distant object we can see with our unaided eyes – binoculars show it easily.

The Pleiades star cluster in Taurus is climbing in the east to herald the glorious winter constellations centered on Orion which is rising due east. Orion, with its three Belt stars pointing down to Sirius, climbs to cross the meridian six hours after our map times. By then, Mars is sinking in the west, Capella in Auriga is the brightest star overhead and Leo stands in the east at about the same height as Mars.

Meteors of the annual Leonids shower reach their peak this month as they stream from the Leo, the reversed question-mark of stars that curl to the north of Leo's main star, Regulus. T

of very swift meteors, with the brighter ones leaving glowing trains in their wake, lasts from the 6th to the 30th but most are seen during the few mornings around the 17th and 18th.

We have been treated to Leonid meteor storms in some years when the parent comet, Temple-Tuttle, has been nearby in its 33-years orbit of the Sun. Sadly, the comet is not due to return until 2031, so meteor rates, even under ideal dark skies, are expected to be as low as 10-20 meteors per hour in 2020. Don't expect to notice any Leonids until the Sickle climbs clear of our horizon after midnight.

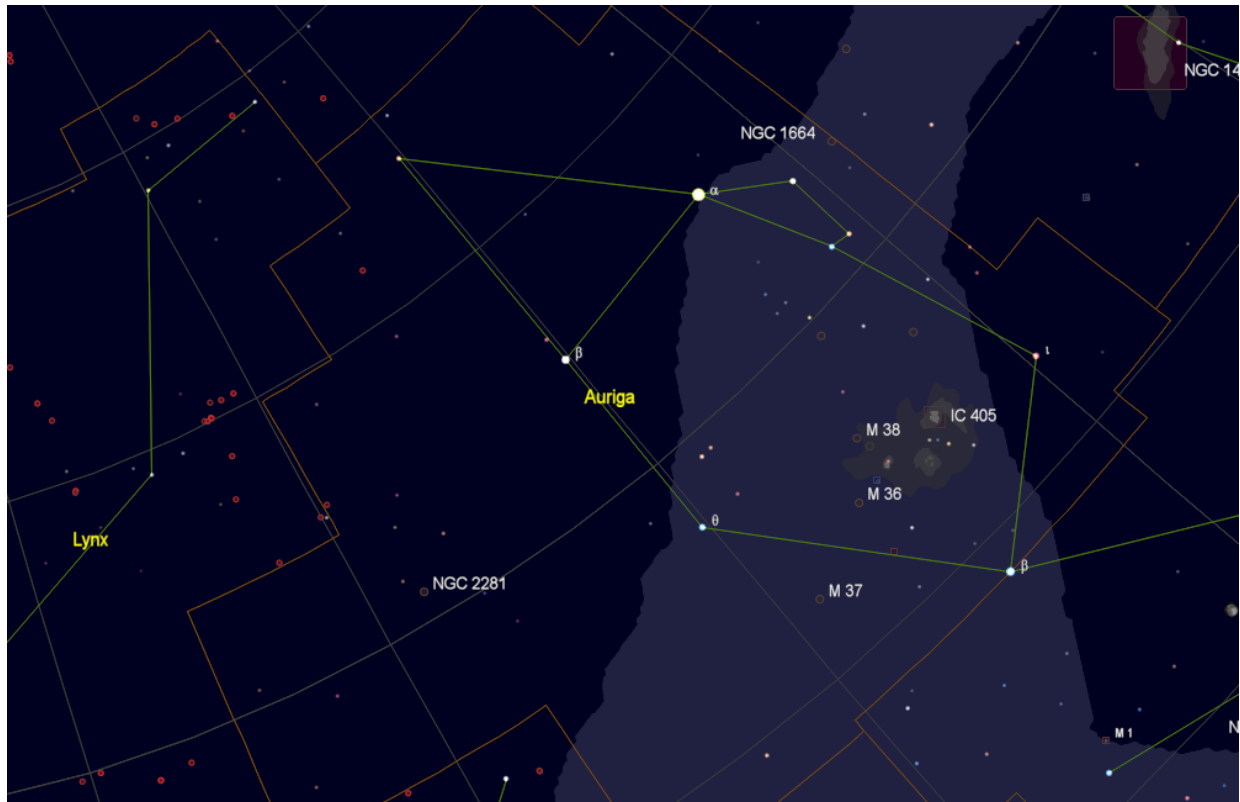
Diary for 2020 November.

- 2nd 08h Moon 6° S of Pleiades
- 3rd 08h Moon 5° N of Aldebaran
- 7th 20h Moon 2.6° N of Praesepe
- 8th 14h Last quarter
- 9th 11h Moon 5° N of Regulus
- 10th 17h Mercury furthest W of Sun (19°)
- 12th 21h Moon 3° N of Venus
- 13th 03h Moon 7° N of Spica
- 13th 21h Moon 1.7° N of Mercury
- 15th 05h New moon
- 15th 13h Venus 4° N of Spica
- 15th 19h Mars stationary (motion reverses from W to E)
- 18th 05h Peak of Leonids meteor shower
- 19th 09h Moon 2.5° S of Jupiter
- 19th 15h Moon 2.9° S of Saturn
- 22nd 05h First quarter
- 25th 20h Moon 5° S of Mars
- 29th 14h Moon 6° S of Pleiades
- 30th 09h Full moon and penumbral lunar eclipse
- 30th 14h Moon 5° N of Aldebaran

This is an extended version, with added diary, of Alan's article published in The Scotsman on October 31 2020, with thanks to the newspaper for permission to republish here.

Explore Auriga the Charioteer

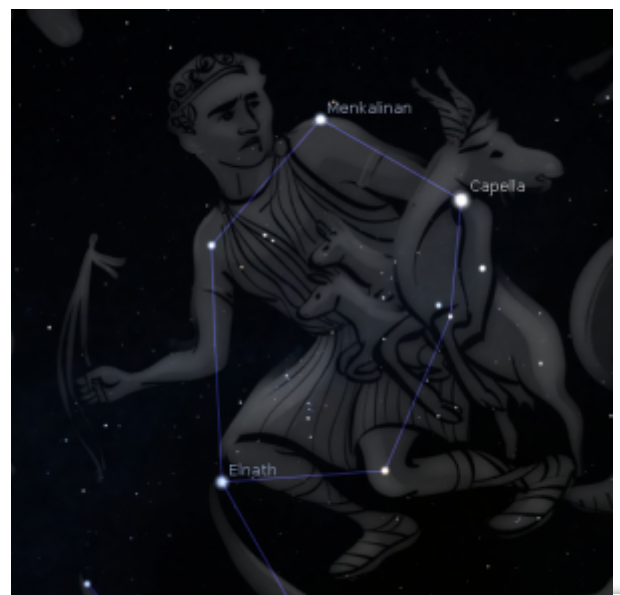
3 November 2020



The Summer Triangle is moving away westwards and as winter approaches we look forward to seeing the likes of Orion, Gemini and Taurus. But in late autumn Auriga is worth a look and it's already getting high in the eastern sky.

Even though it's at the same right ascension (the celestial version of longitude) as Orion, because it's at a much higher declination (celestial latitude) it is already well placed, ahead of Orion. It straddles the northern part of the Milky Way and has a number of interesting objects that are worth a look.

The constellation is dominated by the bright yellow magnitude 0.6 star Capella (Alpha Aurigae), the sixth brightest in the sky and circumpolar from Edinburgh. At a distance of 42.9 light years from Earth, it is relatively close and is actually a quadruple star, made up of two binary systems.



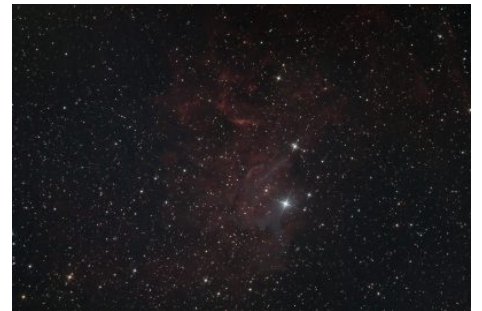
Auriga shown in Stellarium

The Charioteer was one of the 48 constellations identified by Ptolemy in the 2nd century and is bordered on three sides by Gemini, Perseus and Taurus. It even shares a star with the constellation of Taurus: Elnath at the south-east corner is actually Beta Tauri. The three fainter stars just below-right Capella form an asterism known as the Haedi (kids) which can be seen with the naked eye and binoculars.

There are three well-known open clusters in Auriga, all part of the Messier catalogue and all around magnitude 6: M36, M37 and M38. Visible with binoculars but a nice sight through any telescope. Stellarium identifies them as: M36 – Pinwheel Cluster; M37 – January Salt-and-Pepper Cluster; M38 – Starfish Cluster. Are they meaningful names? M38 also has a fainter *bonus* open cluster in the same field, NGC 1907.

The other object of interest, mainly to astro-imagers, is IC 405 (Caldwell 31) the Flaming Star Nebula. It is both an emission and reflection nebula, associated with the irregular variable star AE Auriga. The reflection nebula appears as a blueish *ribbon of smoke* sitting on top of the red emission nebula.

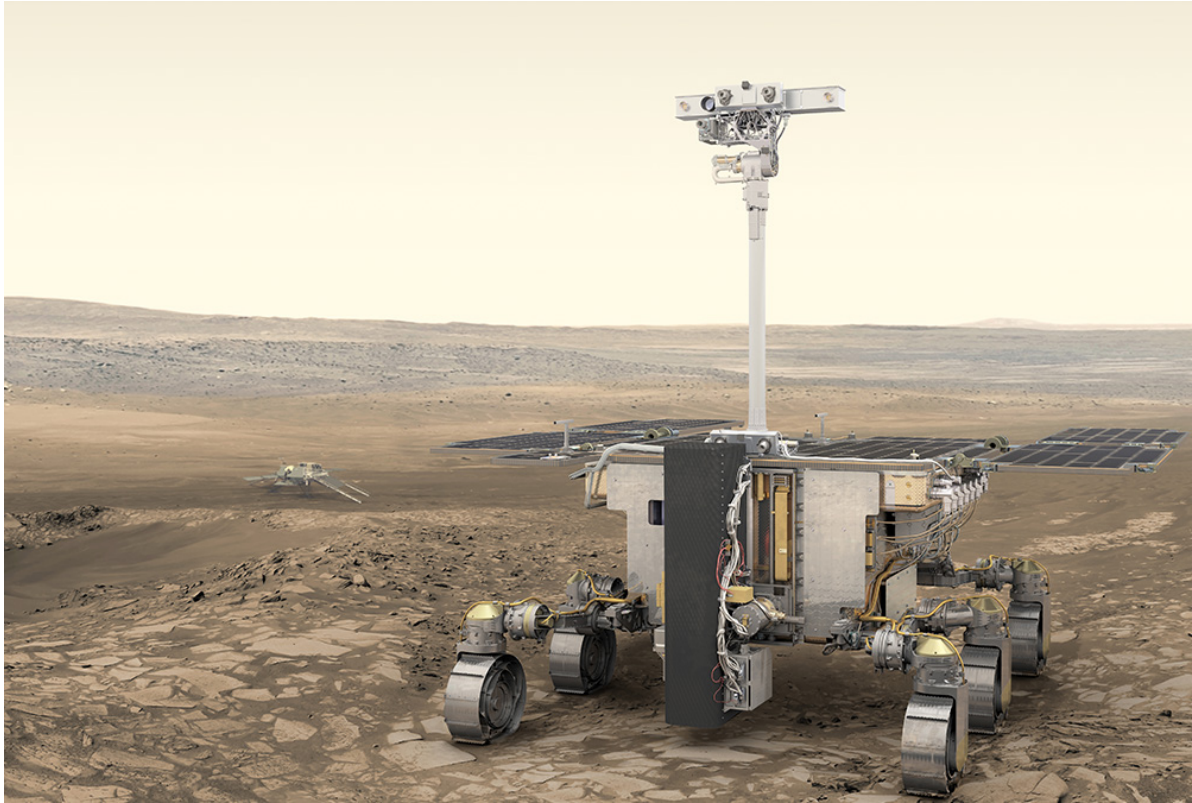
So before the dazzling sights of the winter constellations take over, take a look at Auriga.



Article and images: Mark Phillips
Chart: Cartes du Ciel

Meeting report: Looking for life on Mars with the Rosalind Franklin rover

7 November 2020

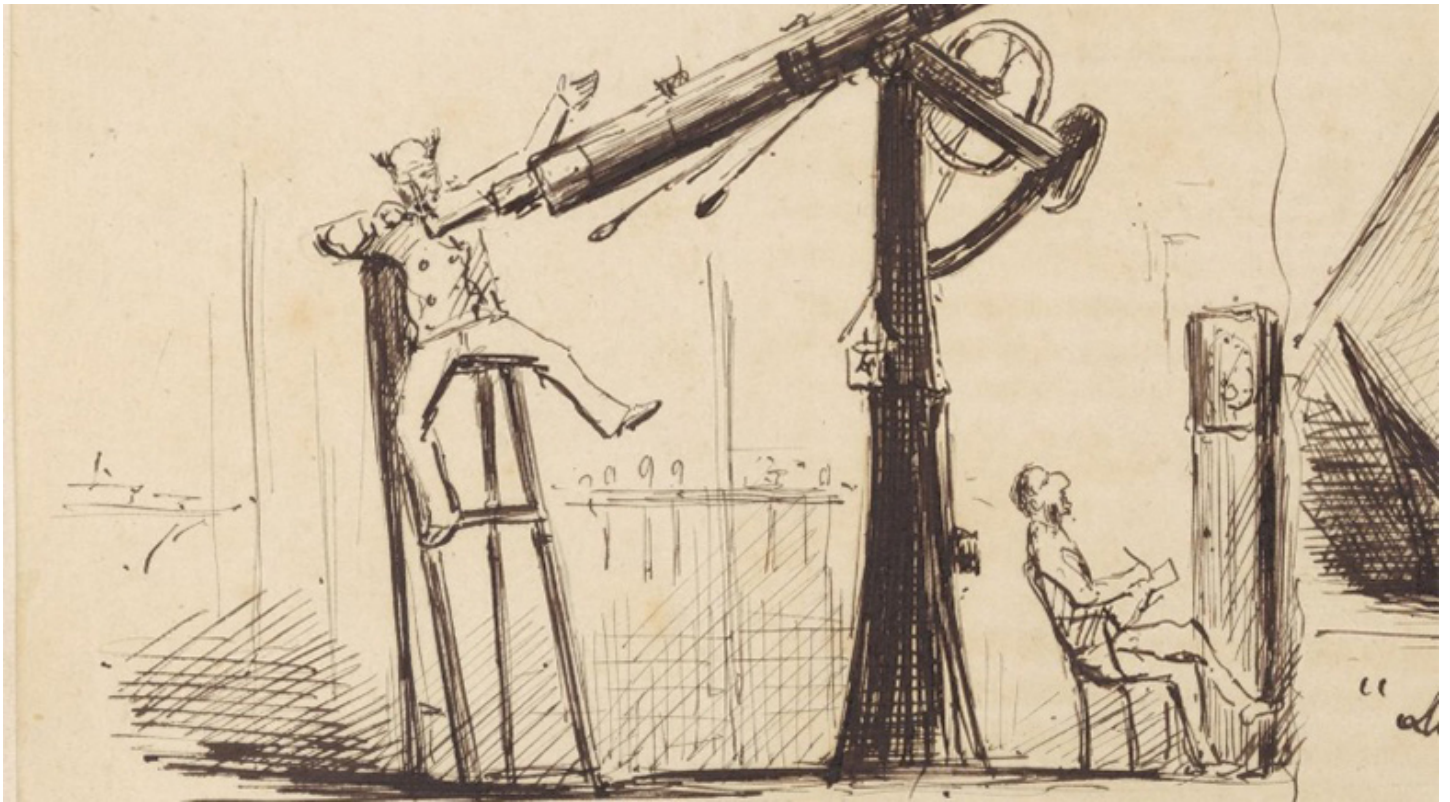


A very engaging and very well attended talk from Professor Andrew Coates on Looking for life on Mars. We also had the Sky in November from Alan Pickup.

Video: https://www.youtube.com/watch?v=gBa_Ld40PaM&t

Meeting report: Edinburgh to Hawai'i – the short astronomical career of John Walter Nichol

20 November 2020



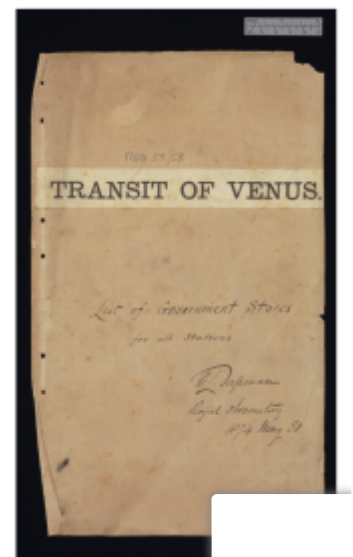
Thank you to Dr Rebekah Higgitt of NMS for this fascinating historical talk. The links to Edinburgh added even more local interest.

We had an introduction by our Honary President Prof. Andy Lawrence too. You can watch the video again or if you missed it. Definitely worth seeing.

Here's a link to the digitised lists of all the equipment and stores taken to all the UK expeditions to see the transit. It turns out that Rebekah was the one who actually digitised it all so was delighted we found it. It's a fascinating insight into how such expeditions were planned and the level of detail is incredible.

As well as all the instruments, accessories and tools, it also lists huts, food stores, Faber HB pencils, 8 dozen black laces, drawing pins – small, tape – red, string – stout, envelopes, small hammers, nails, clock oil, table, chairs, stools, wash-stands, blankets, star charts, Admiralty charts, Astronomer Royal's instructions....

A very long list but worth a look as it really brings it all to life. When you're off to the other side of the world for a rare astronomical event you've got to get it right.



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<https://cudl.lib.cam.ac.uk/view/MS-RGO-00059-00058/1>

We had a look for objects in it that might have helped answer some of our questions about solar filters, diagonals, photographic equipment etc. Some of the items listed include:

- photoheliograph with plates and chemicals – so they were clearly planning to photograph the transit
- speculum diagonals – a mirror diagonal
- dark heads or shades – presumably solar filters

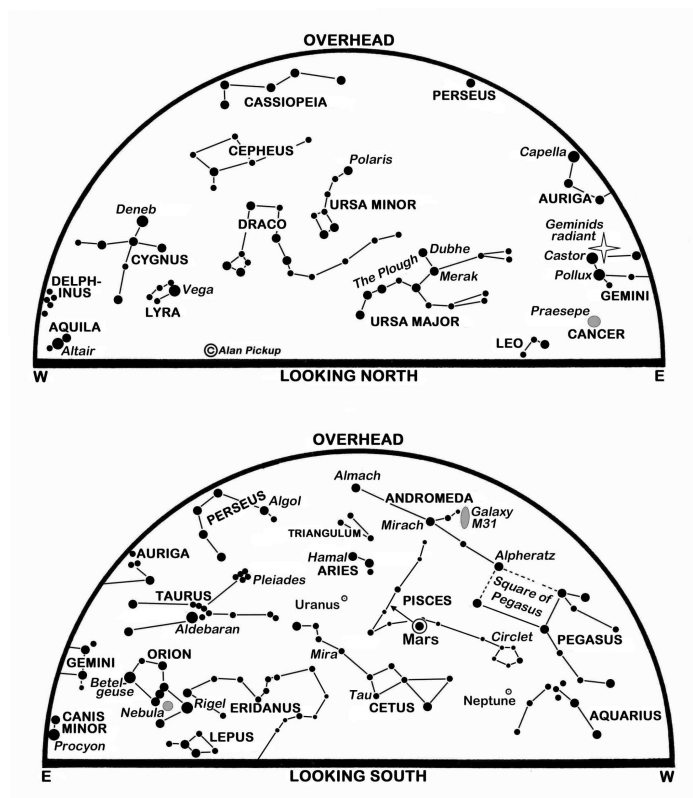
Dr Rebekah Higgitt is a historian of science and Principal Curator of Science, National Museums Scotland.

"The name John Walter Nichol enters the history of astronomy for his participation as an observer in one of the British expeditions to observe the transit of Venus in 1874. He was said to have been an assistant at the Royal Observatory, Edinburgh, but little else has been added; he was just one of the small army of observers mobilised that year. He is, however, brought to life in the caricatures that another member of his expeditionary team produced to record their 'Life and Adventures' on expedition. These prompted me to find out more: what brought this Edinburgh native to astronomy and to Hawai'i, and where did he go next?" Historian of science, Principal Curator of Science, National Museums Scotland

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Scotland's Sky in December 2020

30 November 2020



Jupiter and Saturn in their closest meeting since 1623



Author: [Alan Pickup](#)

The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 31st. An arrow depicts the motion of Mars.

A month that brings the superb Geminids meteor shower under moonless skies, also sees the two largest planets converge for their closest conjunction since the summer of 1623. Back then, though, Jupiter and Saturn were too close to the Sun to be spotted just after sunset. We would need to set our time machine for an early spring morning in 1226 to catch the two planets closer together than they will be this December.

The iconic constellation of Orion, surely the most recognisable one of all, lies opposite the Sun this month so that it dominates our southern sky in the middle of the night. Above it as it climbs in the east this evening is Taurus the Bull whose eye is marked by the orange giant star Aldebaran. The Pleiades star cluster is nearby, but swamped by the bright Moon as the month begins. Once the Moon is out of the way, use binoculars to view Orion's Sword hanging below his Belt and spot the Orion Nebula, a hazy cauldron of gas and dust in which new generations of stars and planets are forming as we watch from a distance of 1,350 light years.

The Geminids shower is expected to peak at about 01:00 on the night of the 13th-14th when, under ideal conditions, 100 or more meteors per hour might be seen streaming away a radiant that lies close to the star Castor in Gemini. This point lies above and left of Orion as it climbs from low in the north-east at nightfall to pass more than 60° high in the south at 02:00. All of which means that, weather permitting, the early morning of the 14th is a time not to be missed if we want to marvel at 2020's best meteor display in full flow.

In fact, the shower lasts from the 4th to the 17th and respectable numbers of its slow meteors arrive between the 12th and the 15th, so there is still hope even if the peak night is clouded out. Remember, too, that we do not need to be facing Gemini to see them – Geminids appear in all parts of the sky and it is just perspective that makes their parallel paths into our upper atmosphere appear to diverge from that direction as they disintegrate at 35km per second.

Jupiter and Saturn have featured low down in our southern night sky for several months, but are now slipping even lower into the south-west as the night begins and set about 90 minutes before our star map times. Even so, and providing we can engineer a clear view in that direction, Jupiter is outstanding at magnitude -2.0 while Saturn is a tenth as bright at magnitude 0.6 and, currently, some 2° above and to Jupiter's left.

Both planets lie 7° to the right of the slender earthlit Moon on the 17th as they edge slowly eastwards (to the left) against the stars to cross from the constellation Sagittarius into Capricornus. Jupiter is moving more quickly, though, and overtakes Saturn on the 21st, passing only 6 arcminutes, or one fifth of a Moon's breadth, south of Saturn. By then, they stand 8° high one hour after sunset and will make an impressive sight in the same telescopic field of view, with Saturn and its stunning rings above Jupiter and its moons.

While they appear so close together, they are at very different distances – Jupiter being 886m km away and Saturn another 734m km beyond Jupiter. At the time, the cloud-banded Jovian disk appears 33 arcseconds wide while Saturn's rings are tipped 21° earthwards and span 35 arcseconds around its 15 arcseconds disk. By Hogmanay, their separation has grown to 1.1° and Jupiter is only 5° high one hour after sunset.

The 21st also brings our winter solstice, when the Sun reaches its furthest south in the sky at 10:02 GMT. The sunrise/sunset times for Edinburgh change from 08:20/15:44 on the 1st, to 08:42/15:40 on the 21st and 08:44/15:48 on the 31st. The Moon is at last quarter on the 8th, new moon on the 14th, first quarter on the 21st and full moon on the 30th.

For the second time in 17 months, and coronavirus permitting, observers in Chile and Argentina have the chance to experience a total eclipse of the Sun on the 14th, though this time the narrow path along which totality is visible sweeps about 1,000 km further south as the Moon's shadow speeds from the Pacific to the Atlantic. Surrounding areas enjoy a partial solar eclipse, but Europe gets nothing.

The dim and distant planets Uranus and Neptune may be glimpsed in our evening sky but cannot compare with the orange light of Mars. True, the latter more than halves in brightness this month, from magnitude -1.1 to -0.2, as its distance grows from 96 million to 134 million km, but it still outshines every star in the sky until Sirius rises in the south-east one hour after our map times.

Now moving eastwards in Pisces, Mars is unmistakable in the south-east at nightfall, passes 41° high across Edinburgh's meridian shortly before the map times and then sinks to our western horizon in the early hours. Telescopically, its disk appears to shrink from 15 to 10 arcseconds which will make it harder to trace the evolution of a Martian dust storm that was first spotted on 12 November and has been photographed by several amateur astronomers, including from Scotland. Catch Mars above the gibbous Moon on the 23rd.

Venus continues as a brilliant (magnitude -4.0) morning object, though it is sinking lower as it moves towards the Sun's far side. The planet rises for Edinburgh at 05:32 on the 1st and at 07:11 on the 31st, while its altitude in the south-east at sunrise halves from 16° to 8° during the period. It lies 7° below-left of the waning earthlit Moon on the 12th. Mercury sweeps around the Sun's far side on the 20th and is hidden from view.

Diary for 2020 December

- 5th 02h Moon 2.7° N of Praesepe
- 6th 17h Moon 5° N of Regulus
- 8th 01h Last quarter
- 10th 12h Moon 7° N of Spica
- 12th 21h Moon 0.8° N of Venus
- 14th 01h Peak of Geminids meteor shower
- 14th 16h New moon and total solar eclipse
- 17th 04h Moon 2.9° S of Jupiter
- 17th 05h Moon 3.1° S of Saturn
- 20th 03h Mercury in superior conjunction
- 21st 10:02 Winter solstice
- 21st 14h Jupiter 0.1° S of Saturn
- 22nd 00h First quarter
- 22nd 09h Peak of Ursids meteor shower
- 23rd 01h Venus 6° N of Antares
- 23rd 18h Moon 6° S of Mars
- 26th 21h Moon 6° S of Pleiades
- 27th 21h Moon 5° N of Aldebaran
- 30th 03h Full moon

This is an extended version, with added diary, of Alan's article published in The Scotsman on November 30 2020, with thanks to the newspaper for permission to republish here.

Here come the Geminids – and no Moon!

1 December 2020



The reliable Geminid meteor shower peaks on the night of 13/14 December and this year the Moon won't get in the way at all.

Watching these wonderful streaks of light, flashing across the sky is always a favourite spectacle to show to non-astronomer family and friends. The Geminids rarely fail to perform and impress. If it's clear, grab the nearest person, put a hat and coat on and get outside!

Meteors from the shower can appear any time between 4 – 17 December but the peak is over the night of 13-14. Although the [Zenith Hourly Rate \(ZHR\)](#) is about 120, because of the radiant's altitude we can probably expect something like 50 meteors per hour at its peak. You are more likely to see more meteors as Gemini rises higher in the sky in the early hours of the morning of 14 December.



Geminids radiant at 10pm 13 December

The radiant is the point from which the meteors appear to radiate in the sky, and for the Geminids this is close to one of the twins, the mag. +1.6 star Castor (α Geminorum). The chart shows the sky at 10pm 13 December, when Gemini is about 40 degrees altitude in the east, Orion is dominating the east and the bright star Capella in Auriga is high overhead.

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The Geminids, first observed in 1862, are caused by asteroid [3200 Paethon](#), and so are unusual because most meteor showers originate from cometary debris, not asteroids. They are medium speed meteors, moving at speeds of 35 km/s, and are probably one of the most consistent annual meteor showers.

However, you never know when a meteor shower is going to put on a special display, as the Geminids did in 2014. Then the number of visible meteors more than doubled over the rates from a *normal* year. So always worth keeping an eye on it.

Observing and imaging the Geminids

Wrap up warm! It is December after all and you don't want to miss the display because you're too cold.

You don't need anything other than a little patience to observe the Geminids. Just lie back in a reclining chair if you can (saves a lot of neck pain) and look up. The advice is usually to look about 30-40 degrees away from the radiant and about 60 degrees up to get a good chance of seeing more meteors. So looking over the constellation of Orion would be a good place to start. But remember meteors can appear in any part of the sky at any time. The closer to the radiant they are, the shorter the trails will be – further away trails appear longer.

To image meteors a camera on a fixed tripod is sufficient, preferably with a remote shutter release, but this is not essential as you can use the camera's delay timer. The length of exposure you can use without stars appearing to trail is dependent on the focal length of the lens you are using. A basic rule of thumb is to divide 500 by the focal length of the lens, and that gives you the exposure in seconds. For example, a 28mm focal length lens should be able to do 18 seconds without any significant trails showing. Work out what the [best ISO is for your camera](#) to make it as sensitive as possible without introducing too much noise. Something between 800 and 3200 should be fine.



Because stars are faint and small your auto-focus may not work well – or at all – so you will probably have to focus the camera manually. This is critical! There's no point spending an evening taking hundreds of exposures only to find that all of them are blurred afterwards. Take some time over this to get it spot on. Here's a [tutorial on using Live View](#) to get the focus right.

If you manage to image or observe the Geminids, please post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Article by Mark Phillips
Chart Cartes du Ciel

Asteroseismology & Exoplanets with the NASA TESS Mission

meeting report

5 December 2020

Last night's meeting was a very well attended, fascinating and informative talk by Prof. William Chaplin from the University of Birmingham.

Worth watching if you missed it. As well as ASE members on Zoom, we had a large international audience joining us on YouTube.

The NASA transiting Exoplanet Survey Satellite (TESS) was launched in 2018. It is providing exquisite photometry to enable searches for new exoplanets and studies of stars and other objects. In this talk I will discuss how we are using these data to conduct asteroseismic studies of stars, by detecting intrinsic stellar pulsations, and providing detailed characterisations of host stars and hence their newly discovered planets.

And Farrow also gave us his take on the interesting objects and events in the night sky in December.

Imaging & Observing Group 2020 in pictures

5 December 2020

We've had a record number of images by more members than ever this year. Here's a sample.

If this is something you want to do and be part of then why not join us and let's learn together.

2020 Review: what a year!

15 December 2020



2020 started normally but soon became unlike any other year. By the end of March things were totally different and we moved online.

There's no doubt that 2020 has been very difficult for many people but we hope we've helped to engage and distract people from the challenges Covid-19 presented. Our membership has certainly grown strongly and we've had thousands of people from Scotland, the UK and all over the world join us online.

A huge thank you to everyone involved in making it happen, to our members and visitors who attended our events. We hope you have a Merry Christmas and a wonderful 2021 – with lots of clear skies.

Here's a summary of what we did:

Moving online

Very quickly we decided to try and be part of the solution and do more than ever. So we adopted Zoom and YouTube as our platforms and ran a very ambitious programme of 2 events per week, on Wednesdays and Fridays from the end of March. We welcomed guest speakers from all over the world and many members stepped up to give a wide variety of talks. Regular weekly email

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newsletters, plus reminders, kept members up to date with what was happening and details of how to access the talks.

There have been many positive comments from members, enjoying the number and range of events we've been able to provide. Going online has also meant that we've gained new members from further away, including the Scottish Borders, Manchester and Surrey.

We had a much needed break in August and when we came back decided to reduce the frequency and hold at least two events online per month, plus the Imaging & Observing Group meetings, plus any ad hoc events that came to mind. Our AGM was postponed from June until October, once we knew what was happening and how the pandemic was progressing. Council meetings were held every 2 months – also online.

Guest talks included:

- 3 April: Longitude and clocks – Prof Giles Hammond
- 17 April: ARIEL and ExoClock – Dr Anastasia Kokori and Dr Angelos Tsiaras
- 1 May: Neutrinos in particle physics and astronomy – Prof Franz Muheim
- 15 May: Hunting Outbursting Young Stars update – Dr Dirk Froebrich
- 17 June: Exploring Alien Atmospheres – Dr Hannah Wakeford
- 3 July: BioRock: wee miners in space – Dr Rosa Santomartino
- 10 July: Things that go Bang in the night – Prof Andy Lawrence
- 18 July: Is Earth Special – Dr David Waltham
- 22 July: Parker Solar Probe – Dr Nour Raouafi
- 4 September: Fast Radio Bursts – Prof Duncan Lorimer
- 6 November: Looking for life on Mars with the Rosalind Franklin rover – Prof Andrew Coates
- 20 November: Edinburgh to Hawaii: the short astronomical career of John Walter Nichol – Dr Rebekah Higgitt
- 4 December: Asteroseismology & Exoplanets with the NASA TESS Mission – Prof William Chaplin

Member talks included:

- Monthly sky notes – Alan Pickup, Horst Meyerderks, Mark Phillips, Andrew Farrow
- 24 April: Using robotic telescopes – Peter Black
- 8 May: Ramblings of an astron*t – Tosh White
- 13 May: Reflections on spaceflight – Jim Nisbet
- 20 May: Spaceship 1 Circling the Moon in 1941 – Clive Davenhall
- 22 May: Telescopes and Scope Talks – Horst Meyerderks, Andrew Farrow
- 27 May: Speed of Light and other stellar effects – Bruce Vickery
- 29 May: Residence above the Clouds' screening to members only – With Prof Andy Lawrence
- 5 Jun: Virtual pub quiz – Andrew Farrow, Peter Black
- 12 Jun: ASE-24 scripts for Stellarium – Neil Martin / Scope Talk – John Murrell

- 19 Jun: Celestial navigation at sea – Jim Anderson
- 24 Jun: Scope Talks – Tosh White, Mike McGovern
- 26 Jun: James Bradley and others Fact Checked – Bruce Vickery
- 1 Jul: The Lundmark Panorama- Clive Davenhall
- 8 Jul: Scope Talk – Ian Smith
- 15 Jul: Thomas Henderson first Astronomer Royal for Scotland – Bruce Vickery
- 18 Sep: Gaia data – John Murrell
- 16 Oct: Choosing a telescope – Mark Phillips
- 11 Dec: Virtual pub quiz – Andrew Farrow, Peter Black, Mark Phillips

Imaging & Observing Group

The Imaging Group was renamed to include observing as we talk about far more than just imaging and want to be as inclusive as possible. It is the most active part of the Society with numbers attending and activity increasing. We held a meeting via Zoom every month and we have an active WhatsApp group where people share ideas, images, tips and general astro-banter.

4-Steps to the Stars

As part of [4-Steps programme](#), Alan Pickup gave his Navigating the Night Sky presentation on 18 February at the Royal Observatory Edinburgh and we went outside afterwards to actually look at the sky in some very windy conditions.

We had originally intended to run the Intro to Astro-imaging course face-to-face but instead Andrew Farrow and Mark Phillips presented it online via Zoom and YouTube. We also added an extra part, Imaging for Science Projects, after two of our talks – ExoClock and HOYS – encouraged us to do more “citizen science with a telescope”. The videos are all on our YouTube channel for anyone to access.

We ran our second Telescope Help Shop on 29 January and a virtual one on 24 September, both very successful.

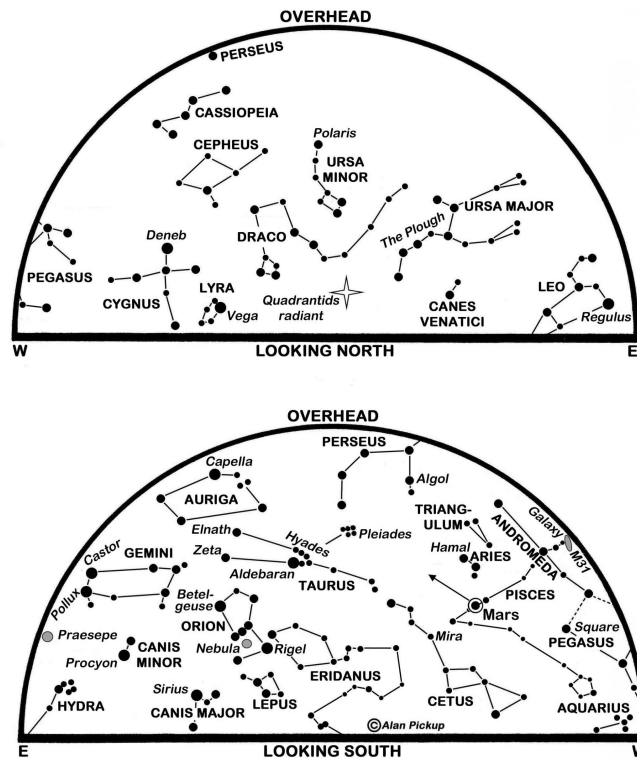
Live streams

We’ve done a number of live streams on Zoom and YouTube from Mark Phillips’s observatory on the edge of Edinburgh. Objects observed include the Moon, Mars and various deep sky objects using EAA techniques.

Article and video: Mark Phillips

Scotland's Sky in January 2021

31 December 2020



Winter stars sparkle as the days start to lengthen



Author: [Alan Pickup](#)

The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 31st. An arrow depicts the motion of Mars.

Their widely publicised meeting behind them, Jupiter and Saturn are now sinking into our twilight at dusk to leave Mars as the only prominent planet in a sparkling winter's sky dominated by the unrivalled constellation of Orion the Hunter. We have only a short time to wait for one of the new year's top three meteor showers, the Quadrantids.

The shower is expected to yield more than 80 meteors per hour for someone under an ideal dark sky. For us, sadly, the peak is rather narrow and expected during daylight on the 3rd. However, respectable numbers should still be seen during the nights of the 2nd and 3rd and, despite the moonlight, particularly during the morning hours as the radiant point from which the meteors appear to diverge climbs high in our eastern sky. This point is plotted on our north star map and lies in what is now northern Bootes, below and left of the Plough's handle.

Mars stands high in the south-east at nightfall, moving into the south-west by our map times onwards to the west-north-western horizon six hour later.

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Like a bright non-twinkling orange-hued star, Mars halves again in brightness from magnitude -0.2 to 0.5 in January as it tracks 15° eastwards from Pisces into Aries. En route it is passed by the Moon which is at first quarter when it stands 9° below-right of the planet on the 20th. On that evening, Mars stands 162 million km away, exactly 100 million km further than it was at its closest in October, and appears less than 9 arcseconds across telescopically. The three spacecraft on their way to Mars are due to arrive between the 11th and 18th of February.

Betelgeuse, the red supergiant star at the top-left shoulder of Orion, is usually outshone (as at present) by the contrasting blue supergiant Rigel at Orion's lower-right. Between them are the three stars of Orion's Belt named, from left to right, Alnitak, Alnilam and Mintaka. Hanging below these, as I mentioned last month, is Orion's Sword with the glowing star-forming region of gas and dust we know as the Orion Nebula – best spotted through binoculars.

The line of the Belt slants down to Sirius, the brightest star in Earth's night sky, and upwards towards the orange giant Aldebaran in Taurus. The latter lies 65 light years away and is a foreground star between us and the V-formation Hyades star cluster, perhaps the most important cluster in the whole sky. At 153 light years, it is the closest and best studied star cluster, having played a vital role in calibrating the relationship between the colours and luminosities of stars while they are generating their energy by fusing hydrogen into helium in their cores. For all its scientific significance, the Hyades usually plays second-fiddle in popular culture to the brighter Pleiades cluster, 12° away to the north-west – catch the Moon between the two on the 23rd.

Following the winter solstice on 21 December, the Sun climbs 6° northwards during January causing Edinburgh's days to lengthen by almost 90 minutes and sunrise/sunset times to change from 08:44/15:50 on the 1st to 08:09/16:44 on the 31st. The Moon is at last quarter on the 6th, new on the 13th, first quarter on the 20th and full on the 28th.

It is just a coincidence that our winter solstice came on the same day as that rare close conjunction between the two largest planets, their closest visible convergence in almost 800 years. However, stories that Jupiter and Saturn formed a "Christmas Star" akin to the Star of Bethlehem are, frankly, overblown and misleading. Anyone expecting a wondrously bright spectacle was to be sorely disappointed since the combined brightness of the two was a barely perceptible 10% greater than that of Jupiter alone, and Jupiter, in any case, is only half as bright as it was in our midnight sky just a few months ago.

We need a clear unobstructed south-western horizon to see Jupiter as it stands 8° high for Edinburgh 30 minutes after sunset on the 1st, and probably binoculars to glimpse Saturn, 1.2° below and to its right. Jupiter shines at magnitude -2.0, brighter than Sirius, while Saturn is a tenth as bright at magnitude 0.6.

They separate as they slide lower into the twilight, so that the equivalent altitude of Jupiter on the 9th is down to 5° and they are a further degree apart. The smallest and innermost planet, Mercury joins them to shine at magnitude -0.9 when it lies 1.8° below Saturn on the 9th and 1.4° below-left of Jupiter on the 11th. By the 14th, with Jupiter down to 3°, Mercury is 4° above-left of Jupiter

same distance to the right of the thin sliver of the young Moon, only 3% sunlit. Saturn reaches conjunction beyond the Sun on the 24th followed by Jupiter five days later.

Mercury remains an evening object as it moves to lie furthest east of the Sun (19°) on the 24th. Between the 19th and 31st, it stands more than 7° high in the south-west 30 minutes after sunset and, horizon permitting, should be easy to spot through binoculars as it dims from magnitude -0.8 and 1.0.

Just as two bright planets slide into our evening twilight, so the most brilliant of all, magnitude -3.9 Venus, is disappearing before dawn. On the 1st, it rises in the south-east 90 minutes before the Sun and stands 7° high at sunrise. By the 25th, though, these numbers diminish to 32 minutes and 3° although it will be late in March before it reaches its so-called superior conjunction on the Sun's far side.

Diary for 2021 January

- 1st 08h Moon 2.7° N of Praesepe
- 2nd 14h Earth closest to Sun (147,093,163 km)
- 2nd 22h Moon 5° N of Regulus
- 3rd 14h Peak of Quadrantids meteor shower
- 6th 10h Last quarter
- 6th 19h Moon 7° N of Spica
- 10th 03h Moon 6° N of Antares
- 11th 20h Moon 1.5° S of Venus
- 13th 05h New moon
- 14th 08h Moon 2.3° S of Mercury
- 20th 21h First quarter
- 21st 06h Moon 5° S of Mars
- 22nd 00h Mars 1.7° N of Uranus
- 23rd 05h Moon 6° S of Pleiades
- 24th 02h Mercury furthest E of Sun (19°)
- 24th 03h Saturn in conjunction with Sun
- 24th 05h Moon 5° N of Aldebaran
- 27th 16h Moon 4° S of Pollux
- 28th 15h Moon 2.6° N of Praesepe
- 28th 19h Full moon
- 29th 02h Jupiter in conjunction with Sun
- 30th 05h Moon 5° N of Regulus

This is an extended version, with added diary, of Alan's article published in The Scotsman on December 31 2020, with thanks to the newspaper for permission to republish here.