

Astronomical Society of Edinburgh

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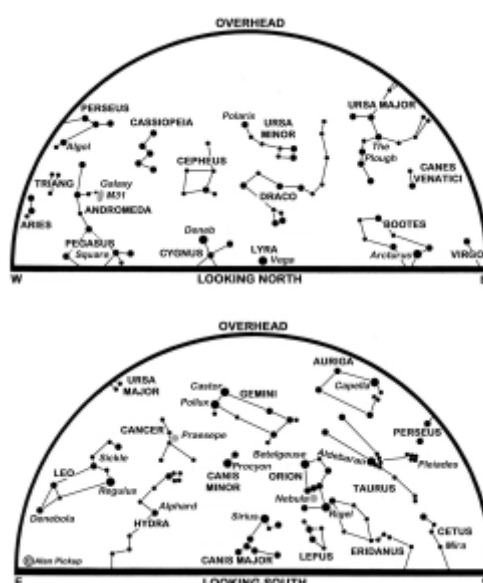
Scotland's Sky in February, 2018

31 January 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, Jupiter, Mars, Mercury, moon, Night Sky, orion, Saturn

Conspicuous Jupiter leads trio of planets before dawn



The maps show the sky at 22:00 GMT on the 1st, 21:00 on the 15th and 20:00 on the 28th. (Click on map to enlarge)

February's main planetary focus is the trio of Jupiter, Mars and Saturn in our predawn sky while Venus and Mercury begin spells of evening visibility later in the period. As the night falls at present, though, our eyes are drawn inevitably to the sparkling form of Orion in our south-eastern sky. Perhaps the only constellation that most people can recognise, it is one of the very few that has any resemblance to its name.

It is easy to imagine Orion's brighter stars as the form of a man, the Hunter, with stars to represent his shoulders and knees, and three more as his Belt. Fainter stars mark his head, a club and a shield, the latter brandished in the face of Taurus the Bull, while his Sword, hanging at the ready below the Belt, contains the fuzzy star-forming Orion Nebula, mentioned here last month.

Since he straddles the celestial equator, the whole of Orion is visible worldwide except from the polar regions. Observers in the southern hemisphere, though, are seeing him upside down as he crosses the northern sky during their summer nights. For us, Orion passes due south about one hour before our map times.

The line of Orion's Belt slants down to our brightest nighttime star, Sirius, in Canis Major which is one of the two dogs that accompany Orion around the sky. The other, Canis Minor, stands higher to its left with the star Procyon.

This, with Sirius and Betelgeuse in Orion's shoulder, form the equilateral Winter Triangle whose centre passes some 30° high in the south at our map times.

The Belt points up to Aldebaran in Taurus and, much further on, to the eclipsing variable star Algol in Perseus which we highlighted last month. This month Algol dims to its minimum brightness at 22:09 GMT on the 7th, 18:58 on the 10th and 23:54 on the 27th.

The Sun climbs 9.5° northwards during February as sunrise/sunset times for Edinburgh change from 08:07/16:46 on the 1st to 07:07/17:45 on the 28th.

A total lunar eclipse occurs when the Moon is full on 31 January, but finishes before the Moon rises for Scotland. The Moon lies close to Regulus in Leo on the 1st and is at last quarter on the 7th. The new moon on the 15th brings a partial solar eclipse for Antarctica and southernmost South America. First quarter occurs on the 23rd when, late in the afternoon, it occults Aldebaran – a telescope should show the star disappearing behind the Moon from 16:37 to 17:47 as viewed from Edinburgh. The Moon is not full again until 2nd March.

Jupiter, brighter than Sirius and the most conspicuous of our morning planets, rises at Edinburgh's east-south-eastern horizon at 02:27 on the 1st and 00:51 by the 28th, and climbs to pass 17° high in the south before we lose it in the dawn twilight. Creeping eastwards in Libra, it brightens from magnitude -2.0 to -2.2 while, viewed telescopically, its cloud-banded disk swells from 36 to 39 arcseconds in diameter.

Mars follows some 12° to the left of Jupiter on the 1st, rising in the south-east at 03:41 and shining at magnitude 1.2 less than a Moon's breadth below the multiple star Beta Scorpii, Graffias, as they climb into the south. The planet tracks quickly eastwards against the stars, sweeping 4° north of the magnitude 1.0 red supergiant Antares on the 10th and making this a good month to compare the two. The name Antares means "rival to Mars" and both are reddish and, this month at least, very similar in brightness. By the 28th, Mars stands 27° from Jupiter, rises at 03:24 and shines at magnitude 0.8.

Saturn, now also a morning object as it creeps eastwards above the Teapot of Sagittarius, rises in the south-east at 06:13 on the 1st and by 04:37 on the 28th when it shines at magnitude 0.6 and is 17° to the left of Mars before dawn. Catch the waning Moon above-left of Jupiter before dawn on the 8th, above Mars on the 9th and above-right of Saturn on the 11th.

Venus is brilliant at magnitude -3.9 as it pulls slowly away from the Sun into our evening twilight but we need a clear west-south-western horizon to see it. Its altitude at sunset doubles from 4° on the 8th to 8° by the 28th, by which day it sets more than one hour after the Sun. As the month ends, use binoculars to look a couple of degrees below-right of Venus for the fainter magnitude -1.3 glow of Mercury as the small innermost planet begins its best evening apparition of the year.

For a real challenge, try to spy the very young Moon when it lies just 1.2° below-left of Venus soon after sunset on the 16th. Barely 20 hours old, the Moon is only 0.7% illuminated and may be glimpsed as the thinnest of crescents. It is more noticeable, and impressively earthlit, as it climbs steeply away from the Sun over the following days.

Alan Pickup

This is a slightly revised version of Alan's article published in [The Scotsman](#) on January 31st 2018, with thanks to the newspaper for permission to republish here.

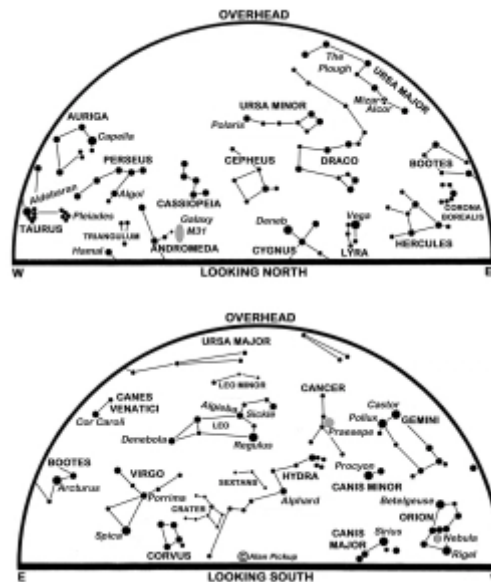
Scotland's Sky in March, 2018

28 February 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, Aldebaran, Antares, ASE, Astronomical Society of Edinburgh, British Summer Time, diary, Earthshine, Hyades, Jupiter

Elusive Mercury is second evening star alongside Venus



The maps show the sky at 23.00 GMT on the 1st, 22.00 GMT on the 16th and 21.00 GMT (22.00 BST) on the 31st. Summer time begins at 01.00 GMT on the 25th when clocks go forward one hour to 02.00 BST. (Click on map to enlarge)

Orion is striding proudly across the meridian as darkness falls, but, even before the twilight dims, we have our best chances this year to spot Mercury low down in the west and close to the more familiar brilliant planet Venus.

Both evening stars lie within the same field-of-view in binoculars for much of March, so the fainter Mercury should be relatively easy to locate using Venus as a guide. Provided, of course, that we have an unobstructed horizon. Mercury never strays far from the Sun's glare, making it the most elusive of the naked-eye planets – indeed, it is claimed that many astronomers, including Copernicus, never saw it.

Blazing at magnitude -3.9, Venus hovers only 9° above Edinburgh's western horizon at sunset on the 1st and sets 64 minutes later. Mercury, one tenth as bright at magnitude -1.3, lies 2.0° (four Moon-breadths) below and to its right and may be glimpsed through binoculars as the twilight fades. Mercury stands 1.1° to the right of Venus on the 3rd and soon becomes a naked eye object as both planets stand higher from night to night, becoming visible until later in the darkening sky.

By the 15th, Mercury lies 4° above-right of Venus and at its maximum angle of 18° from the Sun, although it has more than halved in brightness to magnitude 0.2. The slender young Moon sits 5° below-left of Venus on the 18th and 11° above-left of the planetary pairing on the 19th. Earthshine, "the old Moon in the new Moon's arms", should be a striking sight over the following few evenings.

On the 22nd, the 30% illuminated Moon creeps through the V-shaped Hyades star cluster and hides (occults) Taurus' leading star Aldebaran between 23:31 and 00:14 as they sink low into Edinburgh's west-north-western sky.

Falling back towards the Sun, Mercury fades sharply to magnitude 1.4 by the 22nd when it passes 5° right of Venus and becomes lost from view during the following week. At the month's end, Venus stands 15° high at sunset and sets two hours later.

The Sun climbs 12° northwards in March to cross the sky's equator at the vernal equinox at 16:15 on the 20th, which is five days before we set our clocks forward at the start of British Summer Time. Sunrise/sunset times for Edinburgh change from 07:04/17:47 GMT on the 1st to 06:46/19:49 BST (05:46/18:49 GMT) on the 31st. The Moon is full on the 2nd, at last quarter on the 9th, new on the 17th, at first quarter on the 24th and full again on the 31st.

Orion is sinking to our western horizon at our star map times while the Plough, the asterism formed by the brighter stars of Ursa Major, is soaring high in the east towards the zenith. To the south of Ursa Major, and just reaching our meridian, is Leo which is said to represent the Nemean lion strangled by Hercules (aka Heracles) in the first of his twelve labours. Leo appears to be facing west and squatting in a similar pose to that of the lions at the foot of Nelson's Column in Trafalgar Square.

Leo's Sickle, the reversed question mark that curls above Leo's brightest star Regulus, outlines its head and mane and contains the famous double star Algol whose two component stars, both much larger than our Sun, take more than 500 years to orbit each other and may be seen through a small telescope. Regulus, itself, is occulted as they sink towards Edinburgh's western horizon at 06:02 on the morning of the 1st.

Jupiter, easily our brightest morning object, rises at Edinburgh's east-south-eastern horizon at 00:47 GMT on the 1st and at 23:41 BST (22:41 GMT) on the 31st, climbing to pass around 17° high in the south some four hours later. Brightening from magnitude -2.2 to -2.4, it is slow moving in Libra, being stationary on the 9th when its motion reverses from easterly to westerly. Jupiter is obvious below the Moon on the 7th when a telescope shows the Jovian disk to be 40 arcseconds wide.

If we look below and to the left of Jupiter in the south before dawn, the three objects that catch our attention are the red supergiant star Antares in Scorpius and, further from Jupiter, the planets Mars and Saturn.

Mars lies in southern Ophiuchus, between Antares and Saturn, and is heading eastwards into Sagittarius and towards a conjunction with Saturn in early April. The angle between the two planets falls from 17° to only 1.5° this month as Mars brightens from magnitude 0.8 to 0.3 and its distance falls from 210 million to 166 million km. Mars' disk swells from 6.7 to 8.4 arcseconds, becoming large enough for surface detail to be visible through decent telescopes. Sadly, Mars (like Saturn) is so far south and so low in Scotland's sky that the "seeing" is unlikely to be crisp and sharp.

Incidentally, on the morning of the 19th Mars passes between two of the southern sky's showpiece objects, being a Moon's breadth below the Trifid Nebula and twice this distance above the Lagoon Nebula. Both glowing clouds of hydrogen, dust and young stars appear as hazy patches through binoculars but are stunning in photographs.

Saturn, creeping eastwards just above the Teapot of Sagittarius, improves from magnitude 0.6 to 0.5 and has a 16 arcseconds disk set within its superb rings which span 37 arcseconds at midmonth and have their northern face tipped towards us at 26°. The waning Moon lies above-left of Mars on the 10th and close to Saturn on the 11th.

Diary for 2018 March

Times are GMT until March 25, BST thereafter.

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|-----|--|
| 1st | 06h Moon occults Regulus (disappears at 06:02 for Edinburgh) |
| 2nd | 01h Full moon |
| 4th | 14h Neptune in conjunction with Sun |

5th	18h Mercury 1.4° N of Venus
7th	07h Moon 4° N of Jupiter
9th	10h Jupiter stationary (motion against stars reverses from E to W)
9th	11h Last quarter
10th	01h Moon 4° N of Mars
11th	02h Moon 2.2° N of Saturn
15th	15h Mercury furthest E of Sun (18°)
17th	13h New moon
18th	01h Mercury 4° N of Venus
18th	18h Moon 8° S of Mercury
18th	19h Moon 4° S of Venus
20th	16:15 Vernal equinox
23rd	00h Moon occults Aldebaran (23:31 to 00:14 for Edinburgh)
24th	16h First quarter
25th	01h Start of British Summer Time
27th	02h Moon 1.8° S of star cluster Praesepe in Cancer
31st	14h Full moon

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on February 28th 2018, with thanks to the newspaper for permission to republish here.

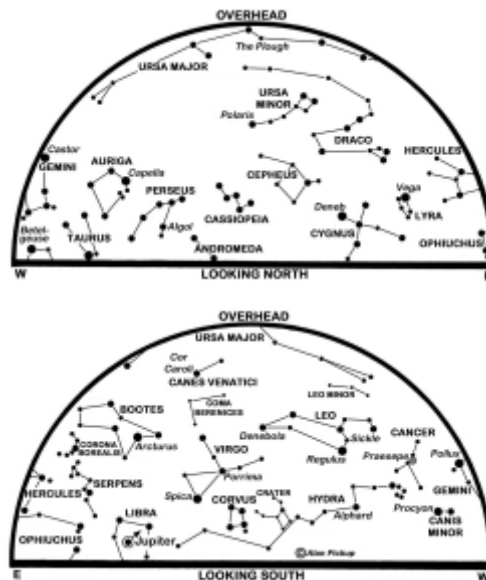
Scotland's Sky in April, 2018

31 March 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, Arcturus, ASE, Astronomical Society of Edinburgh, diary, gegenschein, Jupiter, Libra, Mars, Mercury

Impressive conjunction before dawn for Mars and Saturn



The maps show the sky at midnight BST on the 1st, 23:00 on the 16th and 22:00 on 30th. An arrow depicts the motion of Jupiter. (Click on map to enlarge)

The Sun climbs almost 10° northwards during April to bring us longer days and, let us hope, some decent spring-like weather at last. Our nights begin with Venus brilliant in the west and end with three other planets rather low across the south. Only Mercury is missing – after rounding the Sun's near side on the 1st it remains hidden in Scotland's morning twilight despite standing further from the Sun in the sky (27°) on the 29th than at any other time this year.

Edinburgh's sunrise/sunset times change from 06:44/19:51 BST on the 1st to 05:32/20:50 on the 30th. The Moon is at last quarter on the 8th, new on the 16th, first quarter on the 22nd and full on the 30th.

Mars and Saturn rise together in the south-east at about 03:45 BST on the 1st and are closest on the following day, with Mars, just the brighter of the two, only 1.3° south of Saturn. Catch the impressive conjunction less than 10° high in the east-south-east as the morning twilight begins to brighten.

Both planets lie just above the so-called Teapot of Sagittarius but they are at very different distances – Mars at 166 million km on the 1st while Saturn is nine times further away at 1,492 million km.

Brightening slightly from magnitude 0.5 to 0.4 during April, Saturn moves little against the stars and is said to be stationary on the 18th when its motion reverses from easterly to westerly. Almost any telescope shows Saturn's rings which are tipped at 26° to our view and currently span some 38 arcseconds around its 17 arcseconds disk.

Mars tracks 15° eastwards (to the left) and almost doubles in brightness from magnitude 0.3 to -0.3 as its distance falls to 127 million km. Its reddish disk swells from 8 to 11 arcseconds, large enough for telescopes to show some detail although its low altitude does not help.

Saturn is 4° below-left of Moon and 3° above-right of Mars on the 7th while the last quarter Moon lies 5° to the left of Mars on the next morning.

Orion stands above-right of Sirius in the south-west as darkness falls at present but has all but set in the west by our star map times. Those maps show the Plough directly overhead where it is stretched out of shape by the map projection used. We can extend a curving line along the Plough's handle to reach the red giant star Arcturus in Bootes and carry it further to the blue giant Spica in Virgo, lower in the south-south-east and to the right of the Moon tomorrow night.

After Sirius, Arcturus is the second brightest star in Scotland's night sky. Shining at magnitude 0.0 on the astronomers' brightness scale, though, it is only one ninth as bright as the planet Jupiter, 40° below it in the constellation Libra. In fact, Jupiter improves from magnitude -2.4 to -2.5 this month as its distance falls from 692 million to 660 million km and is hard to miss after it rises in the east-south-east less than one hour before our map times. Look for it below-left of the Moon on the 2nd, right of the Moon on the 3rd, and even closer to the Moon a full lunation later on the 30th.

Jupiter moves 3° westwards to end the month 4° east of the double star Zubenelgenubi (use binoculars). Telescopes show the planet to be about 44 arcseconds wide, but for the sharpest view we should wait until it is highest (17°) in the south for Edinburgh some four hours after the map times.

Venus' altitude on the west at sunset improves from 16° to 21° this month as the evening star brightens from magnitude -3.9 to -4.2. Still towards the far side of its orbit, it appears as an almost-full disk, 11 arcseconds wide, with little or no shading across its dazzling cloud-tops. Against the stars, it tracks east-north-eastwards through Aries and into Taurus where it stands 6° below the Pleiades on the 20th and 4° left of the star cluster on the 26th. As it climbs into our evening sky, the earthlit Moon lies 6° below-left of Venus on the 17th and 12° left of the planet on the 18th.

The reason that we have such impressive springtime views of the young Moon is that the Sun's path against the stars, the ecliptic, is tipped steeply in the west at nightfall as it climbs through Taurus into Gemini. The orbits of the Moon and the planets are only slightly inclined to the ecliptic so that any that happen to be towards this part of the solar system are also well clear of our horizon. Contrast this with our sky just before dawn at present, when the ecliptic lies relatively flat from the east to the south – hence the non-visibility of Mercury and the low altitudes of Mars, Saturn and Jupiter.

The evening tilt of the ecliptic means that, under minimal light pollution and after the Moon is out of the way, it may be possible to see the zodiacal light. This appears as a cone of light that slants up from the horizon through Venus and towards the Pleiades. Caused by sunlight reflecting from tiny particles, probably comet-dust, between the planets, it fades into a very dim zodiacal band that circles the sky. Directly opposite the Sun this intensifies into an oval glow, the gegenschein (German for "counterglow"), which is currently in Virgo and in the south at our map times – we need a really dark sky to see it though.

Diary for 2018 April

Times are BST.

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|-----|--|
| 1st | 19h Mercury in inferior conjunction on Sun's near side |
| 2nd | 13h Mars 1.3° S of Saturn |
| 3rd | 15h Moon 4° N of Jupiter |
| 7th | 14h Moon 1.9° N of Saturn |

7th 19h Moon 3° N of Mars

8th 08h Last quarter

16th 03h New moon

17th 13h Saturn farthest from Sun (1,505,799,000 km)

17th 20h Moon 5° S of Venus

18th 03h Saturn stationary (motion reverses from E to W)

18th 15h Uranus in conjunction with Sun

22nd 23h First quarter

24th 05h Venus 4° S of Pleiades

24th 21h Moon 1.2° N of Regulus

29th 19h Mercury furthest W of Sun (27°)

30th 02h Full moon

30th 18h Moon 4° N of Jupiter

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on March 31st 2018, with thanks to the newspaper for permission to republish here.

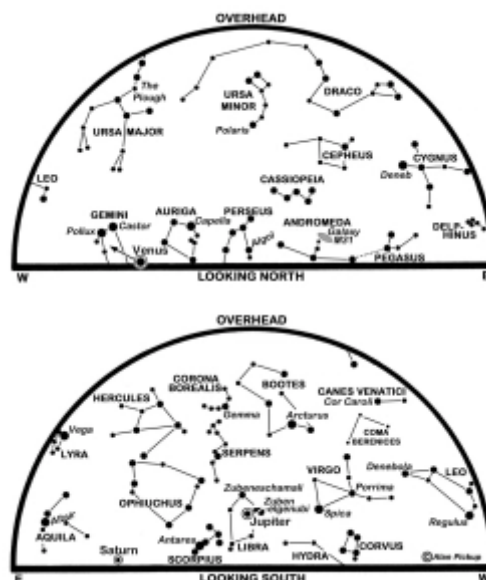
Scotland's Sky in May, 2018

30 April 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, Aldebaran, ASE, Astronomical Society of Edinburgh, Capricornus, Comet Halley, diary, Eta-Aquarids, Gemini, Great Red Spot

Jupiter's conspicuous opposition in the Balance



The maps show the sky at 01:00 BST on the 1st, midnight on the 16th and 23:00 on the 31st. Arrows depict the motions of Jupiter during May and of Venus from the 20th.
(Click on map to enlarge)

Jupiter is at its brightest and best in the constellation of Libra, the Weighing Scales or Balance, this month. Its opposition, when it stands directly opposite the Sun, occurs on the morning of the 9th but it is prominent every night as it transits low across the south from the south-east at nightfall to the south-west before dawn.

Venus, however, outshines it in the western evening sky and both Saturn and the increasingly striking Mars follow Jupiter into the southern morning sky.

The Sun climbs another 7° northwards during May as Edinburgh's sunrise/sunset times change from 05:29/20:52 BST on the 1st to 04:36/21:45 on the 31st. Because twilight is also lengthening, official darkness in the middle of the night lasts for under one hour by May's end.

The Moon is at last quarter on the 8th, new on the 15th, at first quarter on the 22nd and full on the 29th.

Venus stands 20° high in the west at sunset, sinking to set in the north-west by 23:40 on the 1st and one hour later by the 31st. Brilliant at magnitude -3.9, it begins the month 6° above-right of Taurus' brightest star, Aldebaran, and tracks east-north-eastwards between the Bull's horns to end May in mid-Gemini, below Castor and Pollux.

The young earthlit Moon makes an impressive sight almost 6° below-left of the planet on the evening of the 17th. Three days later, as Venus joins the region of sky covered by our chart, it passes 1.0° (two Moon-diameters) above-right of the star cluster M35 whose brightest stars may be glimpsed through binoculars from their distance of some

2,800 light years. Still on the far side of its orbit, Venus approaches from 217 million to 190 million km this month as its almost-full disk swells to 13 arcseconds in diameter.

After dominating our winter nights, Orion ducks below our western horizon as the evening twilight fades at present. The Plough is overhead and Leo high in the south with its main star Regulus which has a close encounter with the first quarter Moon on the night of 21st/22nd.

By our map times, Leo is inking in the west and Jupiter is easily the most conspicuous object in the south though it stands barely 18° high for Edinburgh. Moving westwards in Libra, it lies close to the Moon on the 27th. Its motion takes it from 4° east (left) of the well-known double star Zubenelgenubi at present to lie just 1.0° north-east of the star on the 31st.

Jupiter is 658 million km away at opposition, shines at magnitude -2.5 and shows a 45 arcseconds wide disk through a telescope. Its two main darker cloud bands, its northern and southern equatorial belts, straddle a lighter equatorial zone. The famous Great Red Spot is gradually losing its status, however, being less than half as wide as it was a century ago and currently more salmon-pink in hue than red. It sits in a bay at the southern edge of the south equatorial belt and, like the many other Jovian cloud features, is carried smartly across the disk as the planet spins in just under ten hours.

Steadily-held binoculars show the four main moons of Jupiter, Io, Europa, Ganymede and Callisto which change their configuration to the east and west of Jupiter from night to night, sometimes disappearing as they hide behind Jupiter or cross the disk, along with their shadows.

If Jupiter's low elevation makes telescopic views less than sharp, this is even more the case with Saturn which rises in the south-east at our map times and is 6° lower in the sky than Jupiter as it reaches the meridian just before dawn. Saturn improves from magnitude 0.4 to 0.2 as it creeps westwards above the Teapot asterism in Sagittarius. It lies 1,392 million km away at mid-month when its oblate globe is 18 arcseconds across set within 40 by 17 arcseconds rings that have their north face inclined at 26° to our view. Look for it 4° right of the Moon on the morning of the 5th.

Less than 2° below Saturn is the globular star cluster M22, a ball of thousands of stars that lies about 10,600 light years away and formed some 12 billion years ago. At about magnitude 5.1 and visible as a hazy glow through binoculars, it was the first globular to be discovered and is brighter than M13 in Hercules, the best globular in the northern sky.

Mars lies almost 15° east of Saturn at present and rises at Edinburgh's south-eastern horizon at 02:46 on the 1st. As it more than doubles in brightness, from magnitude -0.4 to -1.2, it also speeds 12° eastwards from Sagittarius to Capricornus so that by the 31st it rises at 01:31 and its fiery glow is unmistakable above the south-south-eastern horizon before dawn.

Catch Mars below the Moon on the morning of the 6th. Telescopically, its disk swells from 11 to 15 arcseconds as its distance falls from 126 million to 92 million km. Its approach opens the optimum window for sending probes to the planet and NASA's InSight lander to study "marsquakes" and the Martian interior is due for launch between 5 May and 8 June.

Meteors of the Eta-Aquarids shower, debris from Comet Halley, appear until the 20th as they radiate from a point that lies low in the east for an hour or so before dawn over Scotland. The shower peaks with some moonlight interference on the 6th and brings a fine shower for watchers further south but only a handful of meteors for us.

Diary for 2018 May

Times are BST

3rd	18h Venus 7° N of Aldebaran
4th	21h Moon 1.7° N of Saturn
5th – 6th	Peak of Eta Aquarids meteor shower
6th	08h Moon 2.7° N of Mars
8th	03h Last quarter
9th	02h Jupiter at opposition at distance of 658 million km
15th	13h New moon
17th	19h Moon 5° S of Venus
22nd	03h Moon 1.5° N of Regulus
22nd	05h First quarter
27th	19h Moon 4° N of Jupiter
29th	15h Full moon

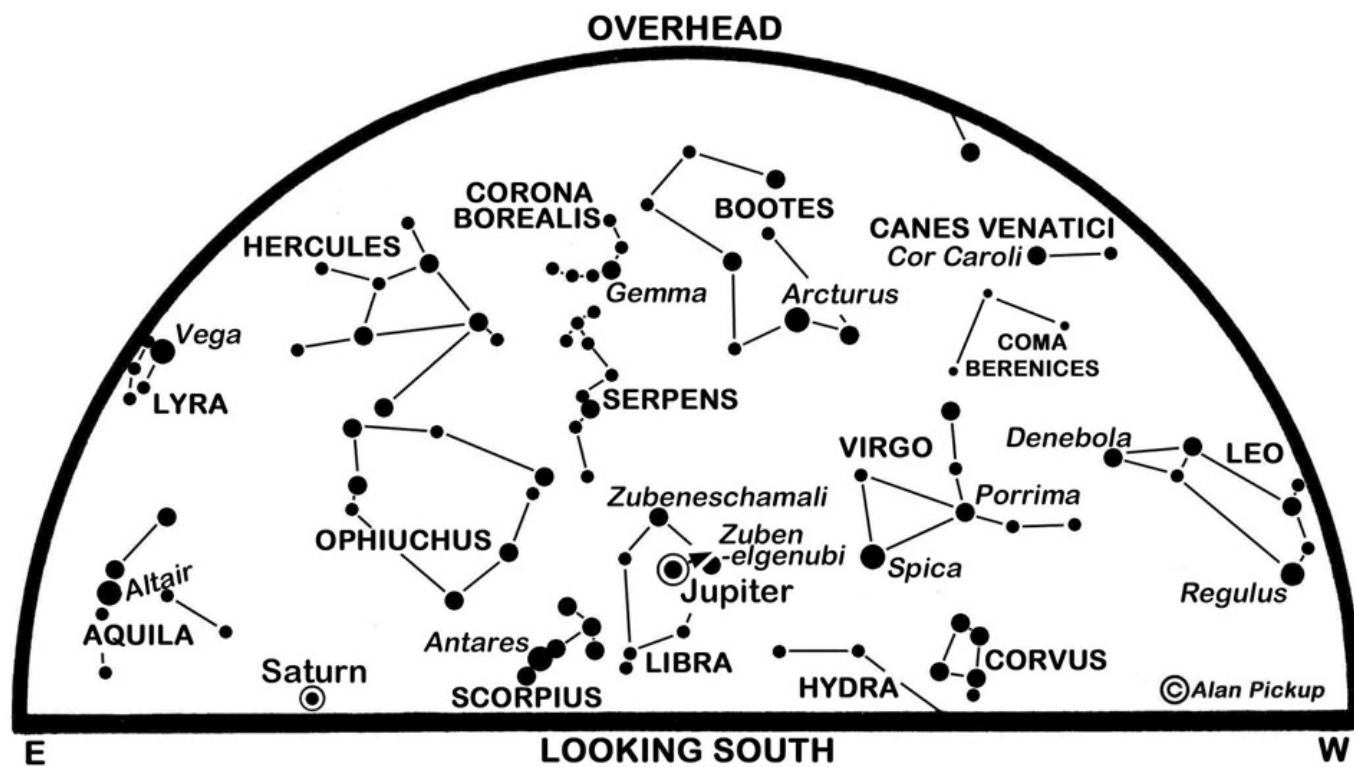
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on April 30th 2018, with thanks to the newspaper for permission to republish here.

Scotland's Sky in May 2018

30 April 2018

Categories: News



You can now find the latest [Scotland Sky Diary](#) by Alan Pickup in the ASE Journal.

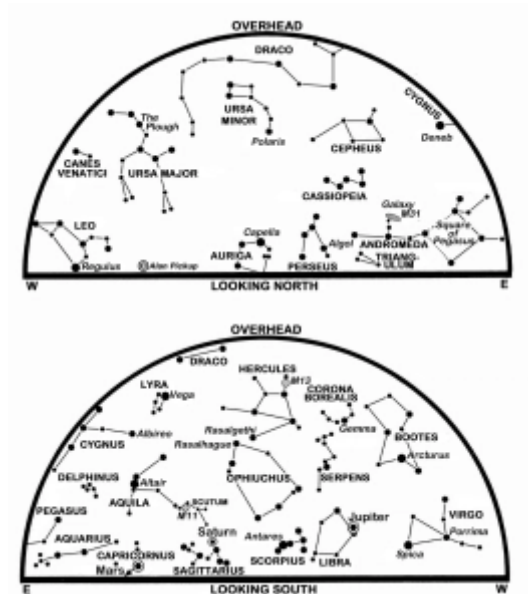
Scotland's Sky in June, 2018

31 May 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, diary, Jupiter, Mars, Mercury, Night Sky, Praesepe, Saturn

Three planets outshine the stars during June's twilit nights



The maps show the sky at 01:00 BST on the 1st, midnight on the 16th and 23:00 on the 30th. An arrow depicts the motion of Mars. (Click on map to enlarge)

Unless our passion is for observing the Sun, Scotland's brief twilit nights can make June a frustrating month for stargazers. This month, though, three planets outshine all the stars, while a fourth, the handsome ringed world Saturn, is at its best for the year.

We are approaching the summer solstice, due this year at 11:07 BST on the 21st when the Sun is overhead at the Tropic of Cancer. On that day, it passes 57.5° high in the south for Edinburgh at 13:14 BST, the time of local noon.

The middle of the following night sees the Sun 10.6° below the northern horizon for Edinburgh and a mere 6.4° below for Lerwick in Shetland which is why, over northern Scotland in particular, only the brighter stars and planets may be glimpsed.

Edinburgh's sunrise and sunset times change from 04:35/21:47 BST on the 1st, to 04:26/22:03 on the 21st and 04:31/22:02 on the 30th. The Moon is at last quarter on the 6th, new on the 13th, at first quarter on the 20th and full on the 28th.

Our chart is timed for around the middle of the night at present and depicts three of those planets as they line up low across our southern sky. Even brighter, though, is the brilliant Venus which blazes at magnitude -4.0 low in the west-north-west after sunset and sinks to set in the north-west at 00:36 BST on the 1st and just before midnight by the 31st.

Although it is still drawing away from the Sun, Venus sinks lower each evening as it tracks further south in the sky, moving from below Castor and Pollux in Gemini to the western fringe of Leo by the 30th. Look for it 6° to the right of

the young Moon on the 16th with the Praesepe star cluster in Cancer just above and to the Moon's right. On that evening, the planet is 174 million km distant and appears through a telescope as a 75% illuminated disk of diameter 14 arcseconds.

Mercury joins Venus in the evening twilight later in the month but is a real challenge to spot through binoculars from our latitudes. For us, the little innermost planet shines at about magnitude 0.0 but stands only 2° high in the north-west one hour after sunset from the 20th onwards.

Foremost among the planets on our star chart is Jupiter which is prominent at magnitude -2.5 in Libra as it moves from low in the south-south-east at nightfall to the south-south-west by the map times. Having stood directly opposite the sun at opposition on 9 May, it dims slightly to magnitude -2.3 and shrinks to 41 arcseconds across by June's end. Binoculars reveal its four main moons to either side and the interesting double star Zubenelgenubi less than a degree to its south over the coming nights. Catch it just below the Moon on the 23rd.

This month it is Saturn's turn to reach opposition when it stands 1,354 million km away on the 27th when it also happens to lie close to the Moon. It passes less than 12 degrees high in the south as seen from Edinburgh in the middle of the night as Vega, the leading star in the Summer Triangle, passes just to the south of overhead.

Improving from magnitude 0.2 to 0.0 to equal Vega in brightness, Saturn is creeping slowly westwards just above the Teapot of Sagittarius though this asterism barely clears our southern horizon. Viewed telescopically, Saturn's disk is 18 arcseconds broad at opposition while its rings span 41 arcseconds and have their north face tipped 26° towards us.

The night's final planet, Mars, is rising above Edinburgh's south-eastern horizon at our map times and climbs to lie 10° high in the south-south-east before dawn. Its orange hue is already conspicuous at magnitude -1.2 and it more than doubles in brightness to magnitude -2.1 by the 30th. Moving eastwards against the stars of Capricornus, it reaches a so-called stationary point on the 28th when its motion reverses to westerly.

Mars approaches from 92 million to only 67 million km during June while its orange-red disk swells from 15 to 21 arcseconds in diameter, becoming large enough for most decent telescopes to reveal something of its surface detail and that its icy south polar cap is tipped at 15° to our view. Mars lies near the Moon on the morning of the 3rd and to the left of the Moon on the 30th.

I mentioned solar observing at the beginning of this note since our long summer days give ample opportunities for viewing the Sun's surface, or so we hope. Of course, I should repeat the serious warning that we must never look directly at the Sun through any binoculars or telescopes – to do so invites critical damage to the eyes, if not blindness. Instead it is possible to project the Sun's image onto a card held away from the eyepiece. Alternatively, obtain an inexpensive but certified "solar filter" and follow the instructions carefully on how to employ this.

Of particular interest are sunspots, dark regions on the solar surface that last for anything from a day to several weeks and mark magnetic storms. Their numbers fluctuate in a cycle of roughly 11 years and, following a peak in activity in 2014, are low at present as we near a so-called sunspot minimum which might be due in 2020. However, sunspot numbers have plummeted in recent months and more than half the days in 2018 have been spotless so far, so it is suggested that the official minimum could occur rather earlier than expected.

Diary for 2018 June

Times are BST

1st 02h Moon 1.6° N of Saturn

3rd 13h Moon 3° N of Mars

6th	03h Mercury in superior conjunction on Sun's far side
6th	20h Last quarter
13th	21h New moon
14th	14h Moon 5° S of Mercury
16th	14h Moon 2.3° S of Venus
16th	21h Moon 1.2° S of Praesepe in Cancer
20th	06h Venus 0.8° N of Praesepe
20th	12h First quarter
21st	11:07 Summer solstice
23rd	20h Moon 4° N of Jupiter
27th	14h Saturn at opposition at distance of 1,354 million km
28th	05h Moon 1.8° N of Saturn
28th	06h Full moon
28th	15h Mars stationary (motion reverses from E to W)

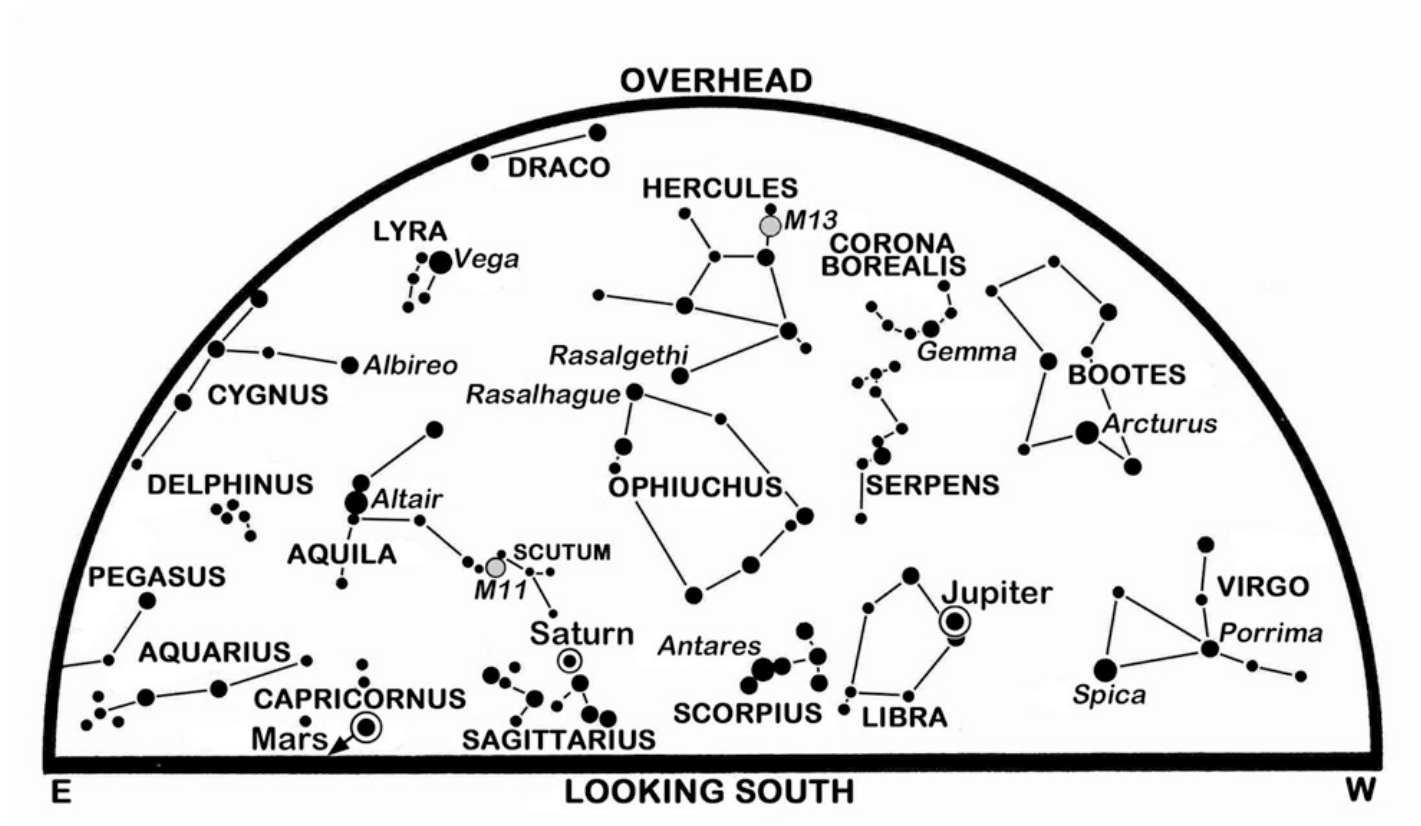
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on May 31st 2018, with thanks to the newspaper for permission to republish here.

Scotland's Sky in June, 2018

31 May 2018

Categories: News



You can now find the latest [Scotland Sky Diary](#) by Alan Pickup in the ASE Journal.

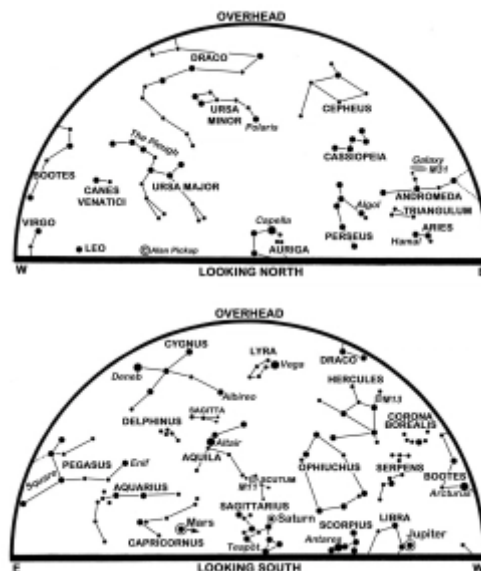
Scotland's Sky in July, 2018

1 July 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, Capricornus, Curiosity, diary, Jupiter, lunar eclipse, Mars, Mercury

Dust storm rages on Mars as it stands closest since 2003



The maps show the sky at 01:00 BST on the 1st, midnight on the 16th and 23:00 on the 31st. An arrow depicts the motion of Mars. (Click on map to enlarge)

Mars comes closer to the Earth in July than at any time since its once-in-60,000-years record approach in 2003. It is just our luck that a dust storm that began a month ago now engulfs the entire planet so that the surface markings may now be glimpsed only through a patchy reddish haze.

Both current Mars rovers, Opportunity and Curiosity, are also affected. This is the most intense storm to impact Opportunity since it landed in 2004 and the vehicle has shut down because it lost power as the dust hid the Sun and coated its solar panels. It is hoped that, after the storm subsides, friendly gusts of wind will waft the dust from the panels and Opportunity will revive. If not, this would mark the end of a remarkable mission which had been planned, initially, to last for only 90 days. Its sister rover, Spirit, succumbed in 2010 after becoming stuck in soft soil.

Meanwhile, the more advanced Curiosity rover has been operating since 2012. Being nuclear powered, it is less vulnerable to the dust but its cameras are recording a dull reddened landscape beneath dusty orange skies.

For watchers in Edinburgh, Mars rises in the south-east just before midnight at the beginning of July and is conspicuous at magnitude -2.2 but only 11° high in the south during morning twilight. Look for it 4° below the Moon on the 1st as Mars moves westwards in the constellation of Capricornus.

Mars reaches opposition on the 27th when it stands opposite the Sun, rises during our evening twilight and is highest in the south in the middle of the night. By then it blazes at magnitude -2.8, making it second only to Venus in brilliance, and stands 58 million km away. A telescope shows it to be 24 arcseconds wide, with its southern polar cap tilted 11° towards us. Because Mars is edging inwards in its relatively elongated orbit, it is actually around 100,000 km closer to us on the 31st.

As Mars rises at its opposition on the 27th it once again lies below Moon, but this time the Moon is deep in eclipse as it passes almost centrally through the Earth's shadow. The total phase of the eclipse, the longest this century, lasts from 20:30 to 22:13 BST and it is in the middle of this period, at 21:22, that the Moon rises for Edinburgh. By 22:13, and weather permitting, it may be possible to see the Moon's dull ochre disk 5° high in the south-east. From then until 23:19, the Moon emerges eastwards from the Earth's dark umbral shadow, and at 00:29 it is free of the penumbra, the surrounding lighter shadow.

The Earth stands at its furthest from the Sun for 2018 (152,100,000 km) on the 6th. Edinburgh's sunrise/sunset times change from 04:31/22:01 on the 1st to 05:15/21:22 on the 31st. The Moon is at last quarter on the 6th and new on the 13th when a partial solar eclipse is visible to the south of Australia. First quarter on the 19th is followed by full moon and the total lunar eclipse on the 27th.

Our chart shows the corner stars of the Summer Triangle, Vega in Lyra, Altair in Aquila and Deneb in Cygnus, high in the south to south-east as the fainter corner stars of the Square of Pegasus are climbing in the east. The Plough stands in the middle of our north-western sky and the "W" of Cassiopeia is similarly placed in the north-east.

Venus sets before our chart times but is brilliant in the west at nightfall. It brightens from magnitude -4.0 to -4.2 but is sinking lower from night to night as it tracks southwards relative to the Sun. It passes 1.1° north of the star Regulus in Leo on the 9th as the much fainter planet Mercury (magnitude 0.4) stands 16° below-right of Venus. The little innermost planet stands furthest east of the Sun (26°) on the 12th but is a challenge to glimpse in the twilight this time around.

Venus lies to the left of the young earthlit Moon on the 15th, below-right of the Moon on the 16th and, by month's end, stands less than 10° high at sunset before setting itself some 70 minutes later.

Jupiter lingers as a conspicuous evening object in the south-south-west at nightfall, sinking to set in the west-south-west one hour after our map times. Moving very little against the stars of Libra, it dims slightly from magnitude -2.3 to -2.1 and shows a 39 arcseconds disk when it lies below-left of the Moon on the 20th.

Saturn reached opposition on June 27 and is at its best at our star map times, albeit low in the south at a maximum altitude of less than 12° for Edinburgh. At magnitude 0.0 to 0.2, it is creeping westwards above the Teapot of Sagittarius where it lies near the Moon on the 24th and 25th. Its disk and wide-open rings appear 18 and 41 arcseconds wide respectively.

Our noctilucent, or "night-shining", cloud season is now in full swing with sightings of several displays of these high-altitude blue-white clouds since late-May and further ones expected until August.

Often with a wispy cirrus-like appearance, noctilucent clouds are composed of ice-crystals at heights near 82 km and glimmer above our northern horizon where they catch the sunlight long after our more usual lower-level clouds are in darkness. Their nature is still something of a mystery but it may not be coincidental that the first definite record of them dates only as far back as 1885, just two years after the cataclysmic eruption of the Krakatoa volcano in Indonesia.

Diary for 2018 July

Times are BST

1st	03h Moon 5° N of Mars
6th	09h Last quarter
6th	18h Earth farthest from Sun (152,100,000 km)
9th	21h Venus 1.1° N of Regulus

11th	05h Jupiter stationary (motion reverses from W to E)
12th	06h Mercury furthest E of Sun (26°)
13th	04h New moon and partial solar eclipse S of Australia
14th	23h Moon 2.2° N of Mercury
16th	04h Moon 1.6° N of Venus
19th	21h First quarter
21st	01h Moon 4° N of Jupiter
25th	07h Moon 2.0° N of Saturn
27th	06h Mars at opposition at distance of 58 million km
27th	21h Full moon and total lunar eclipse
27th	22h Moon 7° N of Mars
29th	Main peak of Delta Aquarids meteor shower
31st	09h Mars closest to Earth (57,590,000 km)

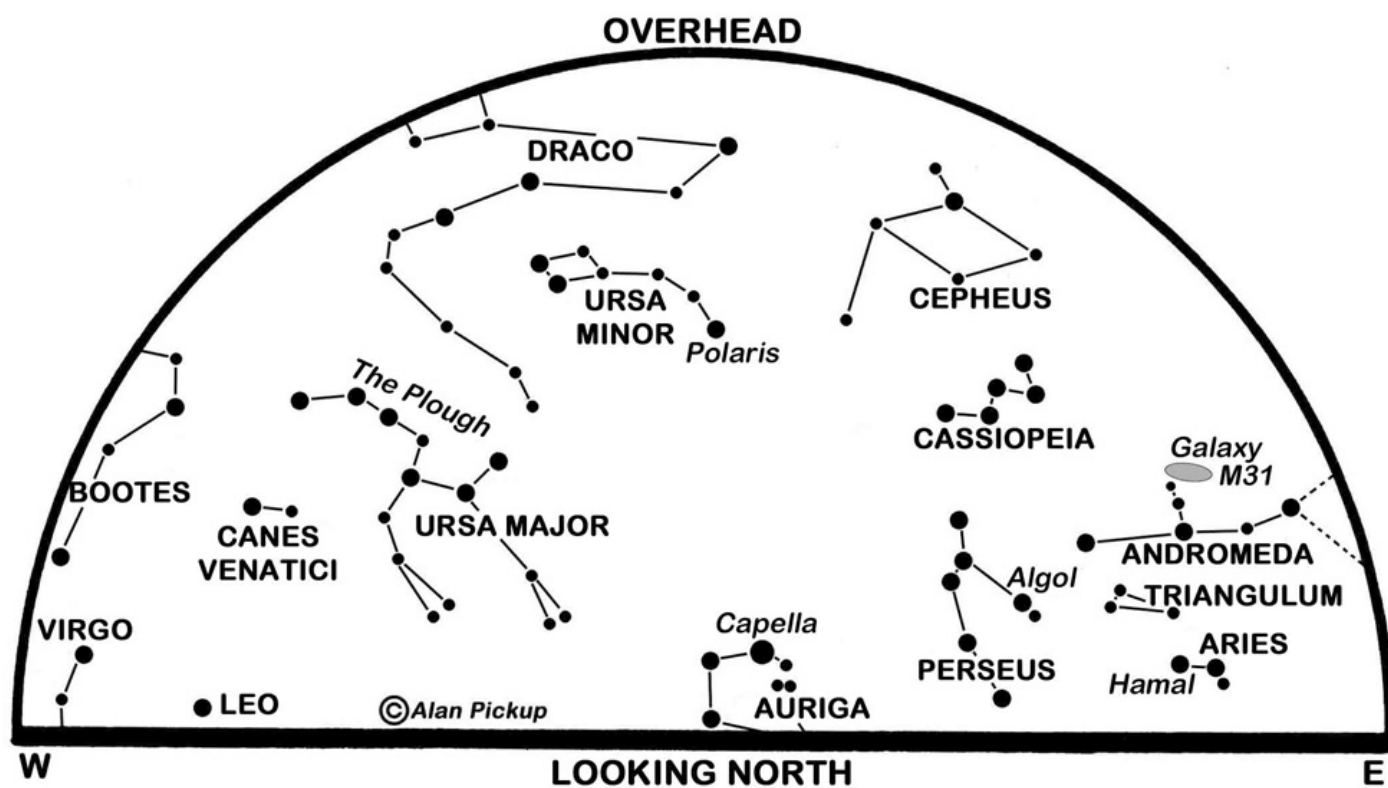
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on June 30th 2018, with thanks to the newspaper for permission to republish here.

Scotland's Sky in July 2018

8 July 2018

Categories: News



You can now find the latest [Scotland Sky Diary](#) by Alan Pickup in the ASE Journal.

Lunar eclipse 27th July 2018

16 July 2018

Categories: News



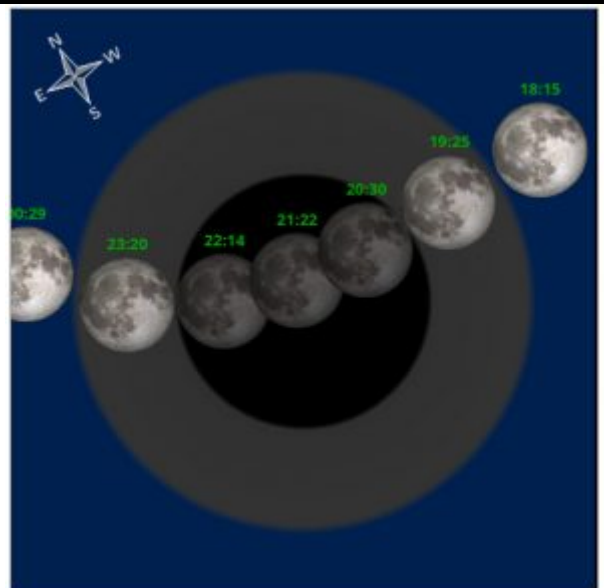
Photo by Jon Watson

There will be a total eclipse of the Moon on Friday 27th July. The Moon will rise fully eclipsed as seen from Edinburgh at 21:21 BST.

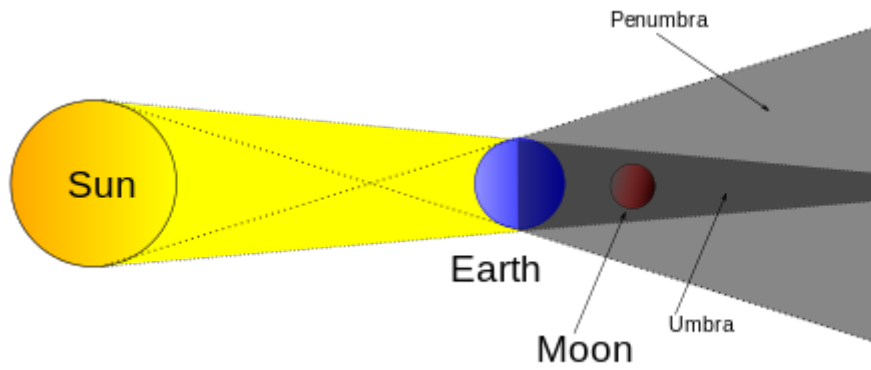
The full moon will rise at about 128° in the East Southeast sky at 9:21 pm, just as the sun sets. The eclipse will be at full stage then, so from Scotland it starts when the moon is well below the horizon. So the large rising moon will be blood red when it rises. Furthermore, Mars will be to the southeast of the Moon in the sky, but won't rise until 10.25 pm, just as the total part of the eclipse is ending.

The total part of the eclipse ends at 10:14 pm from our point of view. The Moon leaves the umbra (darker part of the shadow) at 11:20 pm, and the final penumbra ends at 12:29 am.

Our President Andrew Farrow will be at Blackford Hill with a camera, long lens and tripod if anyone wants to come along. Assuming of course that the weather is kind.



Eclipse times (BST) Source: in-the-sky.org



Lunar eclipse. Image courtesy of F. Sogumo.



The ASE got a mention in a [Scotsman article about the eclipse](#).

Sadly it calls it an “astrological phenomenon” and says clear skies are forecast (they’re not!).

Members of the Astronomical Society of Edinburgh will be heading to the Royal Observatory on Blackford Hill to capture the sight. It will be another two decades before we will see another lunar eclipse anywhere near as long as tomorrow.

A spokesperson for the Astronomical Society of Edinburgh said: “The lunar eclipse on Friday is different due to our position relative to the alignment of the sun and moon providing the longest period of totality this century. If anyone wants to see as much of the event as they can they should head for high ground.”

Mark Phillips

Perseid meteor shower August 2018

23 July 2018

Categories: News



The Perseids, one of the best meteor showers of the year, coincide with a young Moon in 2018, only 2 days old, so conditions are very favourable. The shower reaches its peak on the night of August 12-13 but some will be visible each night from 23 July to 20 August.



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 may be able to see around 50 meteors per hour, since the radiant will be relatively high in the sky. 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.

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".

See [Alan Pickup's Sky Diary](#) for more.

Some useful times on 13 August 2018

Sunrise: 05:38

Sunset: 20:54

Twilight ends: 00:17

Twilight begins: 02:23

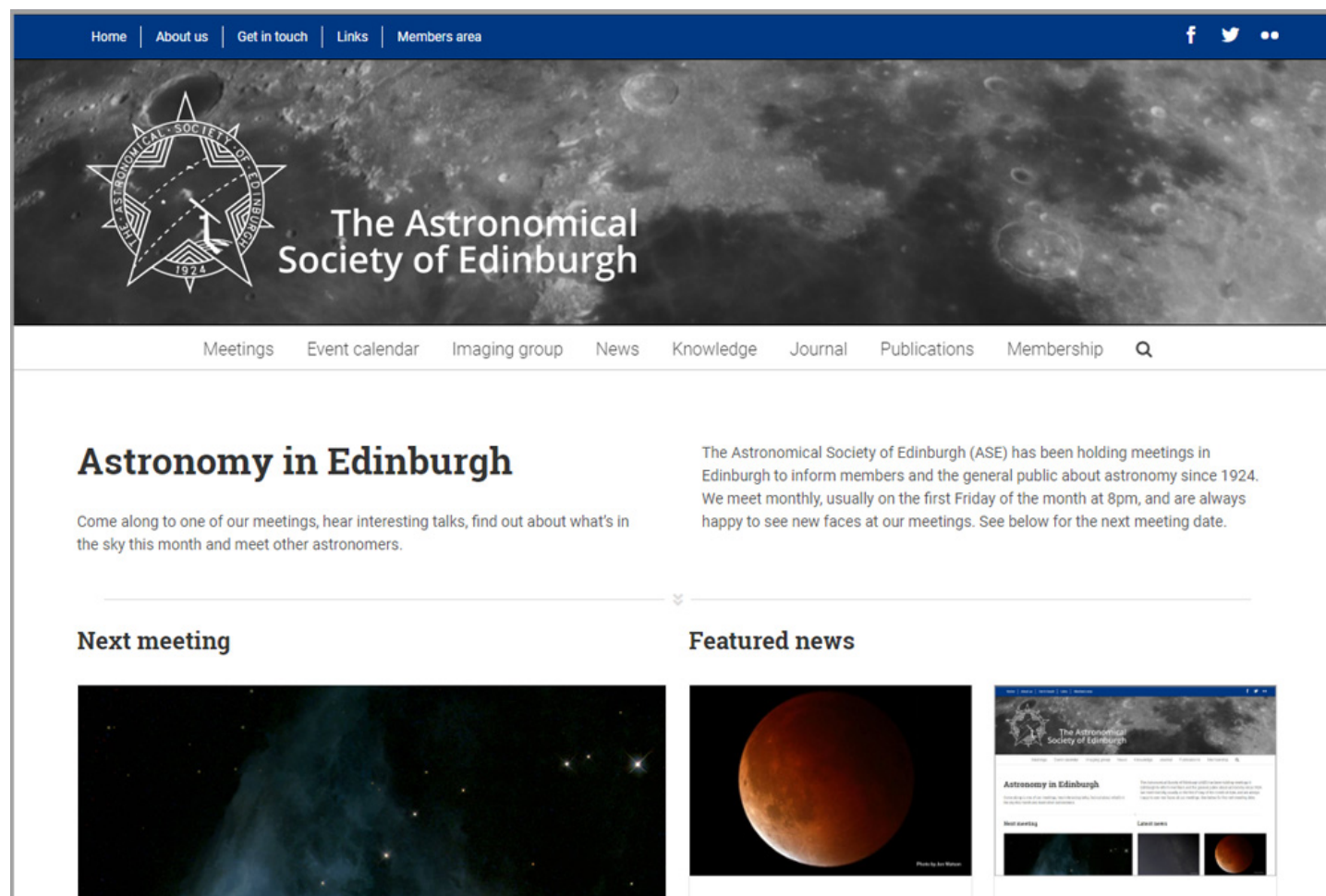
Mark Phillips

Information source: Dominic Ford [in-the-sky.org](https://www.in-the-sky.org)

New website for ASE

25 July 2018

Categories: News



As you can see we have a new website! It's just a starting point as the website will evolve over the next few months. We'll say more at the September meeting.

We must say a big thank you to Horst who has maintained and kept up-to-date the old site so well, and carefully curated a lot of the older historic Society content.

We always happy to hear any suggestions you may have for what should be on the website. So please [get in touch](#).

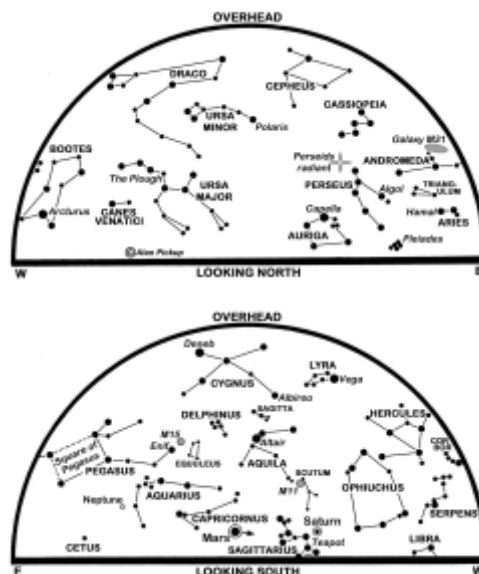
Scotland's Sky in August, 2018

2 August 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, Comet Swift-Tuttle, diary, Jupiter, Mars, Mercury, meteor shower, moon

Perseid meteor shower peaks in planet-rich sky



The maps show the sky at midnight BST on the 1st, 23:00 on the 16th and 22:00 on the 31st. An arrow depicts the motion of Mars. (Click on map to enlarge)

The persistent twilight that has swamped Scotland's night sky since May is subsiding in time for us to appreciate four bright evening planets and arguably the best meteor shower of the year.

The Perseid shower returns every year between 23 July and 20 August as the Earth cuts through the stream of meteoroids that orbit the Sun along the path of Comet Swift-Tuttle. As they rush into the Earth's atmosphere at 59 km per second, they disintegrate in a swift streak of light with the brighter ones often laying down a glowing train that may take a couple of seconds or more to dissipate.

The shower is due to peak in the early hours of the 13th at around 02:00 BST with rates in excess of 80 meteors per hour for an observer under ideal conditions – under a moonless dark sky with the shower's radiant point, the place from which the meteors appear to diverge, directly overhead. We should lower our expectations, however, for although moonlight is not a problem this year, most of us contend with light pollution and the radiant does not stand overhead.

Even so, observable rates of 20-40 per hour make for an impressive display and, unlike for the rival Geminid shower in December, we don't have to freeze for the privilege. Indeed, some people enjoy group meteor parties, with would-be observers reclining to observe different parts of the sky and calling out "meteor!" each time they spot one. Target the night of 12th-13th for any party, though rates may still be respectable between the 9th and 15th.

The shower takes its name from the fact that its radiant point lies in the northern part of the constellation Perseus, see the north map, and climbs from about 30° high in the north-north-east as darkness falls to very high in the east before dawn. Note that Perseids fly in all parts of the sky – it is just their paths that point back to the radiant.

Records of the shower date back to China in AD 36 and it is sometimes called the Tears of St Lawrence after the saint who was martyred on 10 August AD 258, though it seems this title only dates from the nineteenth century.

Sunrise/sunset times for Edinburgh change this month from 05:17/21:20 BST on the 1st to 06:15/20:10 on the 31st. The Moon is at last quarter on the 4th, new on the 11th, at first quarter on the 18th and full on the 26th.

A partial solar eclipse on the 11th is visible from the Arctic, Greenland, Scandinavia and north-eastern Asia. Observers in Scotland north of a line from North Uist to the Cromarty Firth see a thin sliver of the Sun hidden for just a few minutes at about 09:45 BST. Our best place to be is Shetland but even in Lerwick the eclipse lasts for only 43 minutes with less than 2% of the Sun's disk hidden at 09:50. To prevent serious eye damage, never look directly at the Sun.

Vega in Lyra is the brightest star overhead at nightfall and marks the upper right corner of the Summer Triangle it forms with Deneb in Cygnus and Altair in Aquila. Now that the worst of the summer twilight is behind us, we have a chance to glimpse the Milky Way as it flows through the Triangle on its way from Sagittarius in the south to Auriga and the star Capella low in the north. Other stars of note include Arcturus in Bootes, the brightest star in our summer sky, which is sinking in the west at the map times as the Square of Pegasus climbs in the east.

Of the quartet of planets in our evening sky, two have already set by our map times. The first and brightest of these is Venus which stands only 9° high in the west at Edinburgh's sunset on the 1st and sets itself 68 minutes later. By the 31st, these numbers change to 4° and 35 minutes, so despite its brilliance at magnitude -4.2 to -4.4, it is becoming increasingly difficult to spot as an evening star. It is furthest east of the Sun (46°) on the 17th.

Jupiter remains conspicuous about 10° high in the south-west as darkness falls and sets in the west-south-west just before the map times. Edging eastwards in Libra, it dims slightly from magnitude -2.1 to -1.9 and slips 0.6° north of the double star Zubenelgenubi on the 15th. A telescope shows it to be 36 arcseconds wide when it lies below-right of the Moon on the 17th.

The two planets low in the south at our map times are Mars, hanging like a prominent orange beacon only some 7° high in south-western Capricornus, and Saturn which is a shade higher above the Teapot of Sagittarius almost 30° to Mars' right. Mars stood at opposition on 27 July and is at its closest to the Earth (57.6 million km) four days later. A planet-wide dust storm has hidden much of the surface detail on its small disk which shrinks during August from 24 to 21 arcseconds as its distance increases to 67 million km. Although Mars dims from magnitude -2.8 to -2.1, so it remains second only to Venus in brilliance. Catch the Moon near Saturn on the 20th and 21st and above Mars on the 24th.

Finally, we cannot overlook Mercury which is a morning star later in the period. Between the 22nd and 31st, it brightens from magnitude 0.8 to -0.7, rises more than 90 minutes before the Sun and stands around 7° high in the east-north-east forty minutes before sunrise. It is furthest west of the Sun (18°) on the 26th.

Diary for 2018 August

Times are BST

4th	19h Last quarter
9th	01h Mercury in inferior conjunction on Sun's near side
11th	11h New moon and partial solar eclipse
13th	02h Peak of Perseids meteor shower
14th	15h Moon 6° N of Venus

17th	12h Moon 5° N of Jupiter
17th	19h Venus furthest E of Sun (46°)
18th	09h First quarter
21st	11h Moon 2.1° N of Saturn
23rd	18h Moon 7° N of Mars
26th	13h Full moon
26th	22h Mercury furthest W of Sun (18°)
28th	11h Mars stationary (motion reverses from W to E)

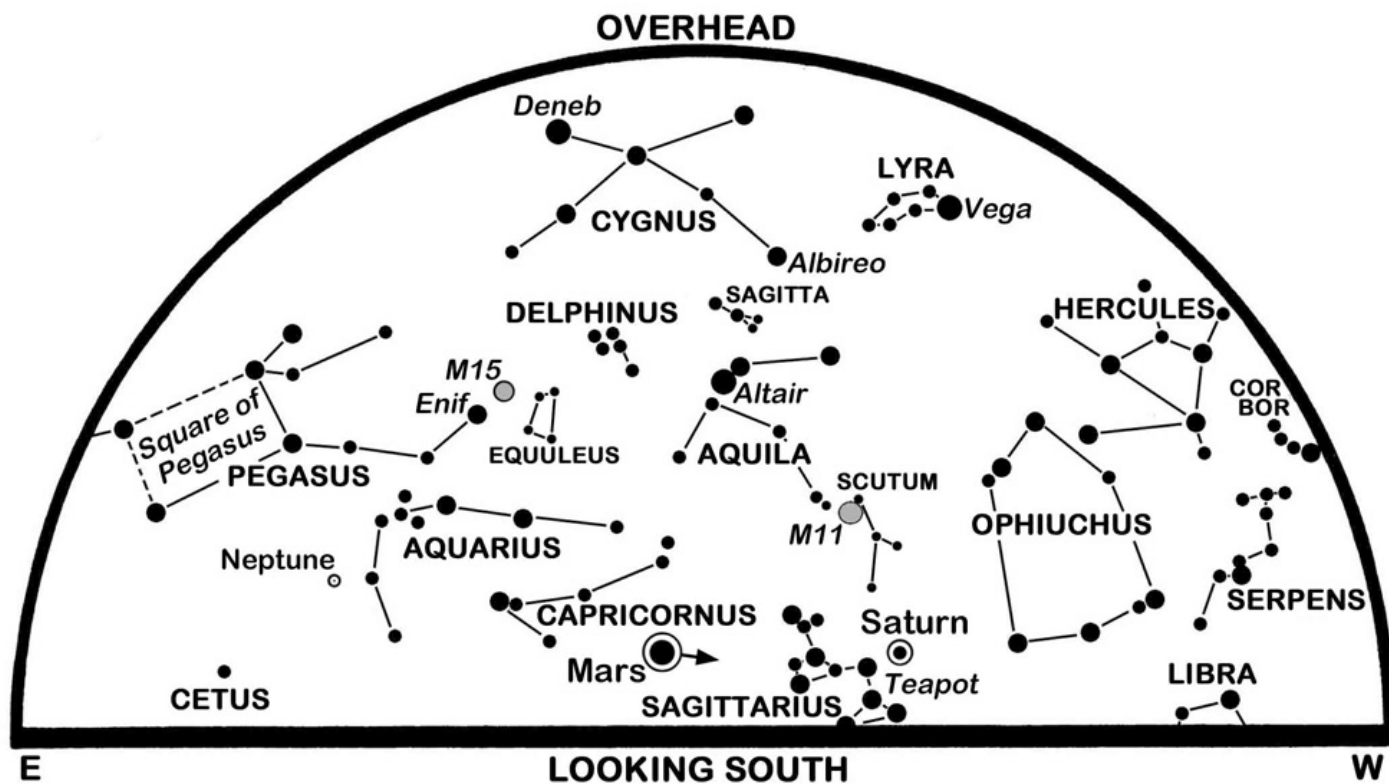
Alan Pickup

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Scotland's Sky in August 2018

2 August 2018

Categories: News



You can now find the latest [Scotland Sky Diary](#) for August by Alan Pickup in the [ASE Journal](#).

Want to learn about astronomy?

4 August 2018

Categories: Knowledge



Here's a pretty comprehensive book, available for FREE on Kindle.

Spectacular launch of Parker Solar Probe

12 August 2018

Categories: News

The NASA Parker Solar Probe lifted off this morning to fly closer to the Sun than ever before.

It was launched on a United Launch Alliance Delta IV Heavy and will become the fastest man-made object ever launched into space if all goes well. The probe will fly through the Sun's outer atmosphere, the corona, and make measurements providing key insights into our star's inner workings.

Find out more on the [NASA Parker Solar Probe page](#).

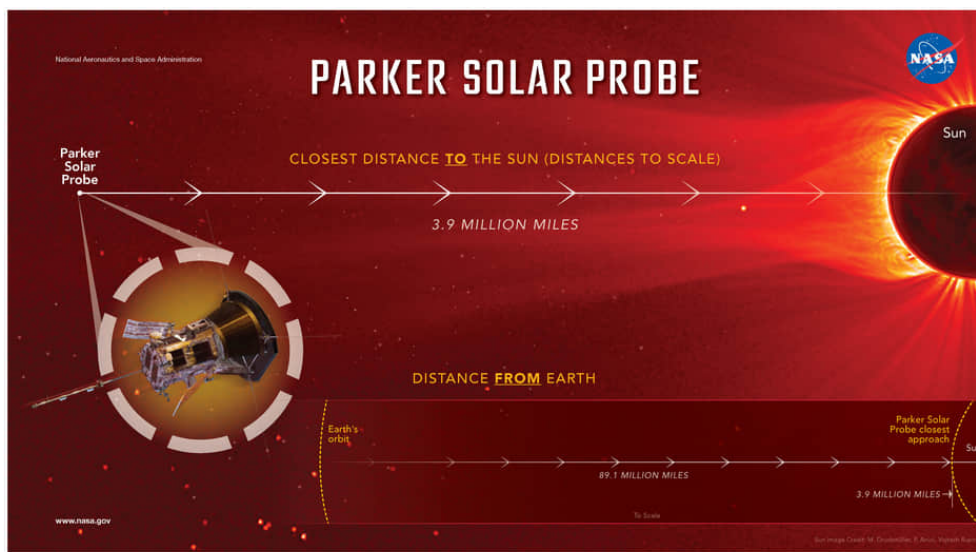
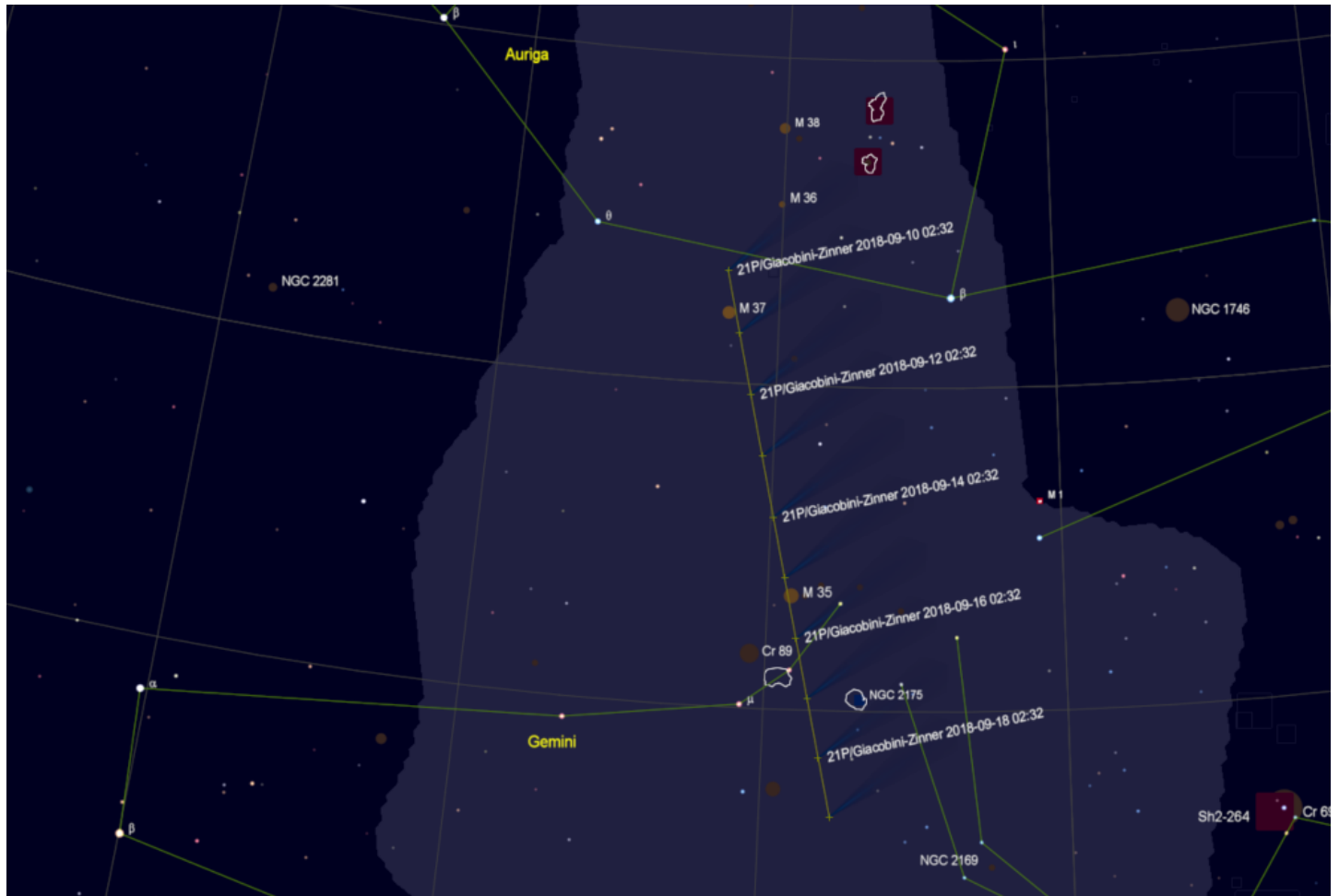


Image credit: Parker Solar Probe close to the Sun

Comet 21P/Giacobini-Zinner UPDATED finder chart and ephemeris

13 August 2018

Categories: News

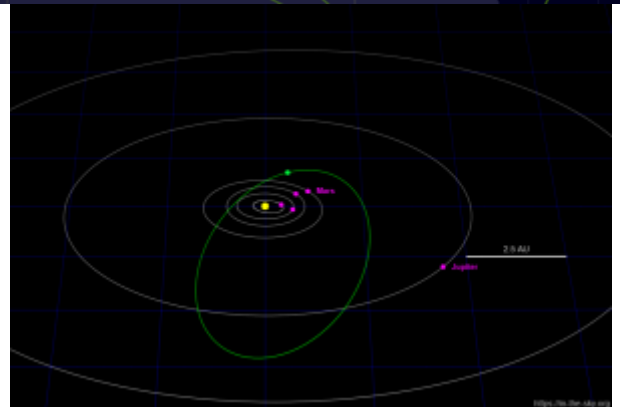


Periodic comet 21P/Giacobini-Zinner is now brightening and expected to reach a peak magnitude of 7.1 on 5 Sep 2018. This will make it a binocular and telescopic target. Its position in the sky should also make it easy to observe and image from Edinburgh once the summer twilight leaves us.

On 1 August it should be mag 9 brightening to mag 8 on 15 August. It moves from the constellation Draco to Cassiopeia and then on to Camelopardalis during August. This makes it a circumpolar object for most of August, meaning that it never sets from Edinburgh.

It's always difficult to predict precisely what a comet's brightness will be as it approaches the Sun, so worth keeping an eye on them as they may have outbursts of activity as they heat up.

21P/Giacobini-Zinner is a regular returner to our skies with an orbital period of 6.54 years. Its closest



21P orbit 1 Aug 2018

Comet Giacobini-Zinner is the comet responsible for the Draconid meteor shower which normally happens 6 – 10 October each year. Normally this is

point to the Sun is at 1.01 AU, almost exactly the same distance as Earth is from the Sun. It then travels out to a distance of 5.98 AU, just beyond the orbit of Jupiter.

not a particularly active shower with a ZHR (Zenith Hourly Rate) of about 10 meteors per hour. However, this year it's possible that we may see a ZHR of 20-50 meteors per hour, because on the 9th October this year we will pass through the dust left by the tail of the comet in 1900. One to watch maybe and we'll update you about it closer to the time.

If you manage to image or observe the comet, why not post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Here's an image from our [Flickr group](#) taken by Mark Phillips. There are 20 x 15s frames, taken over 14 minutes, stacked together and aligned on the comet nucleus. Because the comet is moving against the stars they appear to trail.



Mark Phillips

Information source: Dominic Ford in-the-sky.org

Albireo is not a true binary star

15 August 2018

Categories: News



So it turns out that everyone's favourite double star, Albireo, is not a true binary system. The components are about 60 light years apart and simply an optical alignment. This was confirmed by the latest GAIA data release.

Does this news change anything for the average amateur astronomer? Probably not – it's still the most beautiful double star in the sky! Previous data from Hipparcos had indicated that it probably wasn't a true binary, but the [GAIA data](#) (not particularly user-friendly!) has now confirmed this. Parallax data shows the stars at distances of 100 and 119 parsecs respectively – about 60 light years apart, and their proper motions are completely different too.

Speckle interferometry in the 1970s indicated that the primary orange star may actually be a very close double or even triple system, but this is still not confirmed. Future GAIA releases may be able to shed more light on this.

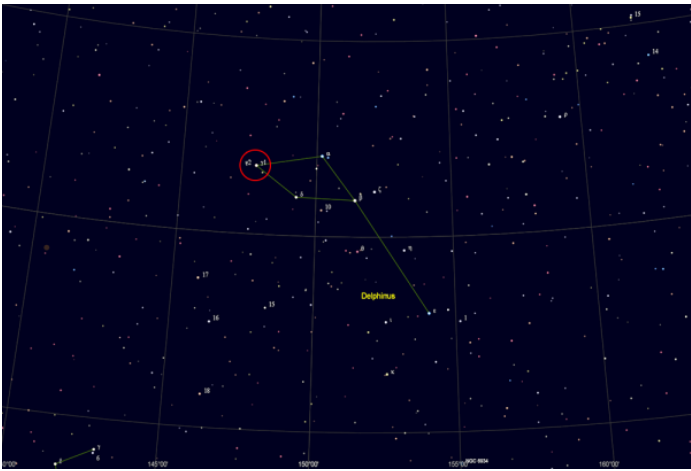
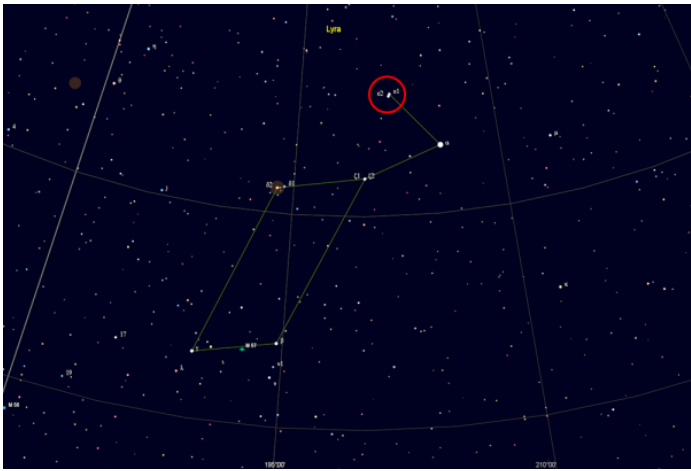
There are of course other interesting doubles in the Summer sky worth having a look at. Try these two:

Epsilon Lyrae – the double-double star

A telescope is required to separate each star into doubles. All components are yellow-white.

Gamma Delphini

A yellow primary with a greenish secondary. A small telescope will split them.



Finder charts: Cartes du Ciel

Mark Phillips

It's Globular cluster season

20 August 2018

Categories: News



I always love this time of year: the summer twilight is receding, it's still quite mild in the evenings and the Globular clusters start to become visible again. I like to image these beautiful objects and there are many of them, well-placed in the sky at the moment.

The chart shows the view from Edinburgh at about 10:30pm (BST) as astronomical twilight ends on the 1st of September, looking South. Eight of the brighter Globulars are marked on the chart but there are other fainter ones too. Locate them using your favourite planetarium program.



The brighter ones, such as the Great Globular M13 in Hercules and M15 in Pegasus, are relatively easy to observe, even with binoculars. But it takes a telescope to start to resolve the individual stars and imaging to really bring out the details.

Globular clusters are very densely packed collections of stars, usually spherical in shape, containing thousands to millions of relatively old stars, distributed in a halo surrounding our galaxy. There are about 150 known Globulars in our galaxy. They probably formed before the rest of the galaxy stabilised into a disc and so contain some of the oldest stars in our galaxy.

If you manage to image or observe any Globular clusters this season, why not post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Mark Phillips

Chart: Dominic Ford [in-the-sky.org](#)

M13 image: [Mark Phillips](#)

Full Moon observing

24 August 2018

Categories: Knowledge, News



Full Moon is only a few days away but don't let it stop you doing astronomy. Yes it's very bright and blots out most of the fainter objects in the sky, but it has a beauty and interest all of its own.

This month full Moon falls on August 26th (12:58 BST to be exact) so it's midday on the Moon and there are very few shadows. Although the shadows that other phases provide can pick out details with more clarity, some Lunar features are best seen when the Moon is full. Here are a few examples of the things you should look for:

Ray craters

The 2 main ray craters are Copernicus and Tycho. The rays are the ejecta from the impacts that caused those craters. Generally ray craters are relatively young as the ejected material overlays the rest of the terrain. Smaller Kepler, close to Copernicus, also shows up well.

Bright features

Some features appear very bright under this illumination such as the craters Aristarchus and Proclus. Aristarchus is the brightest of the larger Lunar features with an [albedo](#) (a measure of its reflectivity) twice that of most other features. Proclus has interesting oblique, asymmetrical impact rays – the ejecta only seems to be to one side of the crater.



Lunar Maria

All the Lunar seas are well shown at full Moon. Pick out as many as you can, even with binoculars. There are “lakes” (lacus) and “bays” (sinus) to find too.

These are just a few features but there are many more. [Virtual Moon Atlas Pro](#) is an excellent piece of free software that shows a huge amount of detail on all Lunar features. Recommended!

If you image or observe any Lunar features, why not post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Article and Image credit: Mark Phillips

Free online astronomy courses

24 August 2018

Categories: Knowledge



Here are some free courses you might like to try out from the Open University:

<http://www.open.edu/openlearn/science-maths-technology/free-courses>

Click on Astronomy in the left hand filter bar.

There are courses on:

- The Sun
- Moons of our Solar System
- In the night sky: Orion
- Galaxies, stars and planets
- The Moon
- Active Galaxies
- Jupiter and its moons
- And many more... all free...

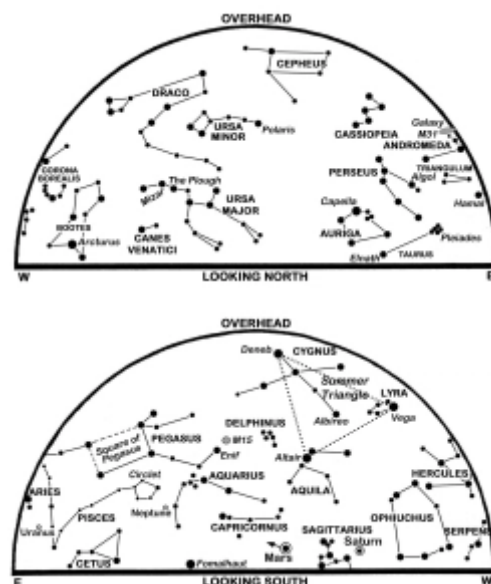
Scotland's Sky in September, 2018

31 August 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, Albireo, Altair, Aquila, ASE, Astronomical Society of Edinburgh, autumn equinox, capella, Coathanger, Comet Giacobini-Zinner

Summer Triangle stars as autumn evenings begin



The maps show the sky at 23:00 BST on the 1st, 22:00 on the 16th and 21:00 on the 30th. An arrow depicts the motion of Mars. (Click on map to enlarge)

We may be edging towards autumn, but the Summer Triangle, the asterism formed by the bright stars Vega, Altair and Deneb, looms high in the south as night falls and shifts into the high south-west by our star map times later in the evening. Vega, almost overhead as the night begins, is the brightest of the three and lies in the small box-shaped constellation of Lyra the Lyre.

The next brightest, Altair in Aquila the Eagle, stands lower in the middle of our southern sky and, at 16.7 light years (ly), is one of the nearest bright stars to the Sun – eight light years closer than Vega. Flanking Altair, like the two sides of a balance, are the fainter stars Alshain (below Altair) and Tarazed (above) whose names come from “shahin-i tarazu”, the Arabic phrase for a balance.

Deneb, 25° from Vega, lies very high in the south-east at nightfall and overhead at our map times. It marks the tail of Cygnus the Swan which is flying overhead with wings outstretched and its long neck reaching south-westwards to Albireo, traditionally the swan’s beak. Although it is the dimmest corner-star of the Triangle, Deneb is one of the most luminous stars in our galaxy. Current estimates suggest that it shines some 200,000 time more brightly than our Sun from a distance of perhaps 2,600 ly, but its power and distance are hard to measure and the subject of some controversy.

Also controversial is the nature of Albireo. Even small telescopes show it as a beautiful double star in which a brighter golden star contrasts with a dimmer blue one. The mystery concerns whether the pair make up a real binary, with the two stars locked in orbit together by gravity, or whether this is just the chance alignment of two stars at different distances. Now measurement by the European Space Agency’s Gaia spacecraft appear to confirm the chance alignment theory.

The Milky Way, the band of countless distant stars in the plane of our galaxy, flows through the Summer Triangle and close to Deneb as it arches across our evening sky. Scan it through binoculars to glimpse a scattering of other double stars and star clusters.

One interesting stellar group is the so-called Coathanger which lies 8° , a little more than a normal binocular field-of-view, south of Albireo. It is also easy to locate one third of the way from Altair to Vega. Its line of stars, with a hook of stars beneath, gives it the appearance of an upside-down coat hanger. For decades this was regarded as a true star cluster, whose stars formed together, and its alternative designations as Brocchi's Cluster and Collinder 399 reflect this. In 1998, though, results from the Hipparcos satellite, Gaia's predecessor, proved that the Coathanger's stars are at very different distances so that it, like Albireo, is simply a fortuitous chance alignment.

The Sun sinks 11.5° southwards during September to cross the sky's equator at 02:54 BST on the 23rd. This marks our autumnal equinox and, by one definition, the beginning of autumn in the northern hemisphere. Sunrise/sunset times for Edinburgh change from 06:17/20:07 BST on the 1st at 07:13/18:51 on the 30th. The Moon is at last quarter on the 3rd, new on the 9th, at first quarter on the 17th and full on the 25th.

Venus is brilliant at magnitude -4.4 and 45° from the Sun on the 1st but it is only 4° above Edinburgh's west-south-western horizon at sunset and sets 35 minutes later as its evening apparition as seen from Scotland comes to an end.

The other inner planet, Mercury, is prominent but low in the east-north-east before dawn until about the 14th. Glimpse it at magnitude -1.1 when it lies 1° above-left of Regulus in Leo on the 6th and 9° below-left of the impressively earthlit waning Moon on the 8th.

Jupiter is conspicuous but very low in the south-west at nightfall, sinking to set in the west-south-west one hour before our map times. Look for it below-right of the Moon on the 13th.

Saturn and Mars are in the far south of our evening sky. Saturn, the fainter of the two at magnitude 0.4 to 0.5, stands above the Teapot of Sagittarius and is just below and right of the Moon on the 17th when a telescope shows that its rings span 38 arcseconds around its 17 arcseconds disk. It sets in the south-west some 70 minutes after our map times.

Mars stands more than 25° east (left) of Saturn, tracks 7° eastwards and northwards in Capricornus and stands near the Moon on the 19th and 20th. It is easily the brightest object (bar the Moon) in the sky at our map times though it more than halves in brightness from magnitude -2.1 to -1.3. As its distance increases from 67 million to 89 million km, its ochre disk shrinks from 21 to 16 arcseconds. The dust storm that blanketed the planet since June has now died down.

Finally, we have a chance to spot the Comet Giacobini-Zinner as it tracks south-eastwards past the bright star Capella in Auriga, low in the north-east at our map times but high in the east before dawn. The comet takes only 6.6 years to orbit the Sun and should appear in binoculars as a small oval greenish smudge only 0.9° to the right of Capella on the evening of the 2nd when it is 60 million km away. Moving at almost 2° per day, it passes less than 7° north-east of Elnath in Taurus (see chart) on the morning of the 11th, just a day after it reaches perihelion, its closest (152 million km) to the Sun.

Diary for 2018 September

Times are BST

2nd 10h Venus 1.4° S of Spica

3rd 03h Moon 1.2° N of Aldebaran

3rd	04h Last quarter
6th	11h Saturn stationary (motion reverses from W to E)
7th	04h Moon 1.1° S of Praesepe in Cancer
7th	19h Neptune at opposition
8th	23h Moon 0.9° N of Mercury
9th	19h New moon
10th	08h Comet Giacobini-Zinner closest to Sun (152 million km)
14th	03h Moon 4° N of Jupiter
16th	14h Mars closest to Sun (206,661,000 km)
17th	00h First quarter
17th	17h Moon 2.1° N of Saturn
20th	08h Moon 5° N of Mars
21st	03h Mercury in superior conjunction
23rd	02:54 Autumnal equinox
25th	04h Full moon
30th	09h Moon 1.4° N of Aldebaran

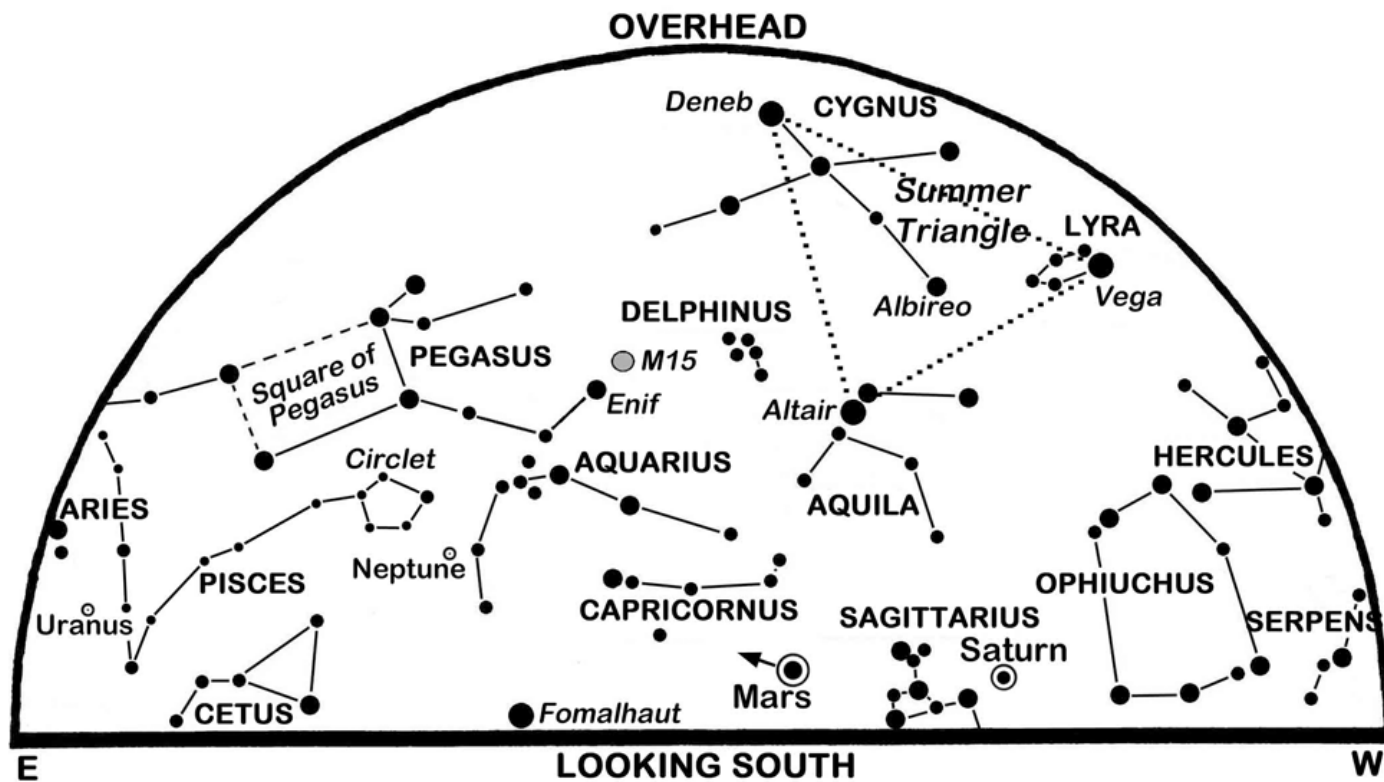
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on August 31st 2018, with thanks to the newspaper for permission to republish here.

Scotland's Sky in September 2018

31 August 2018

Categories: News

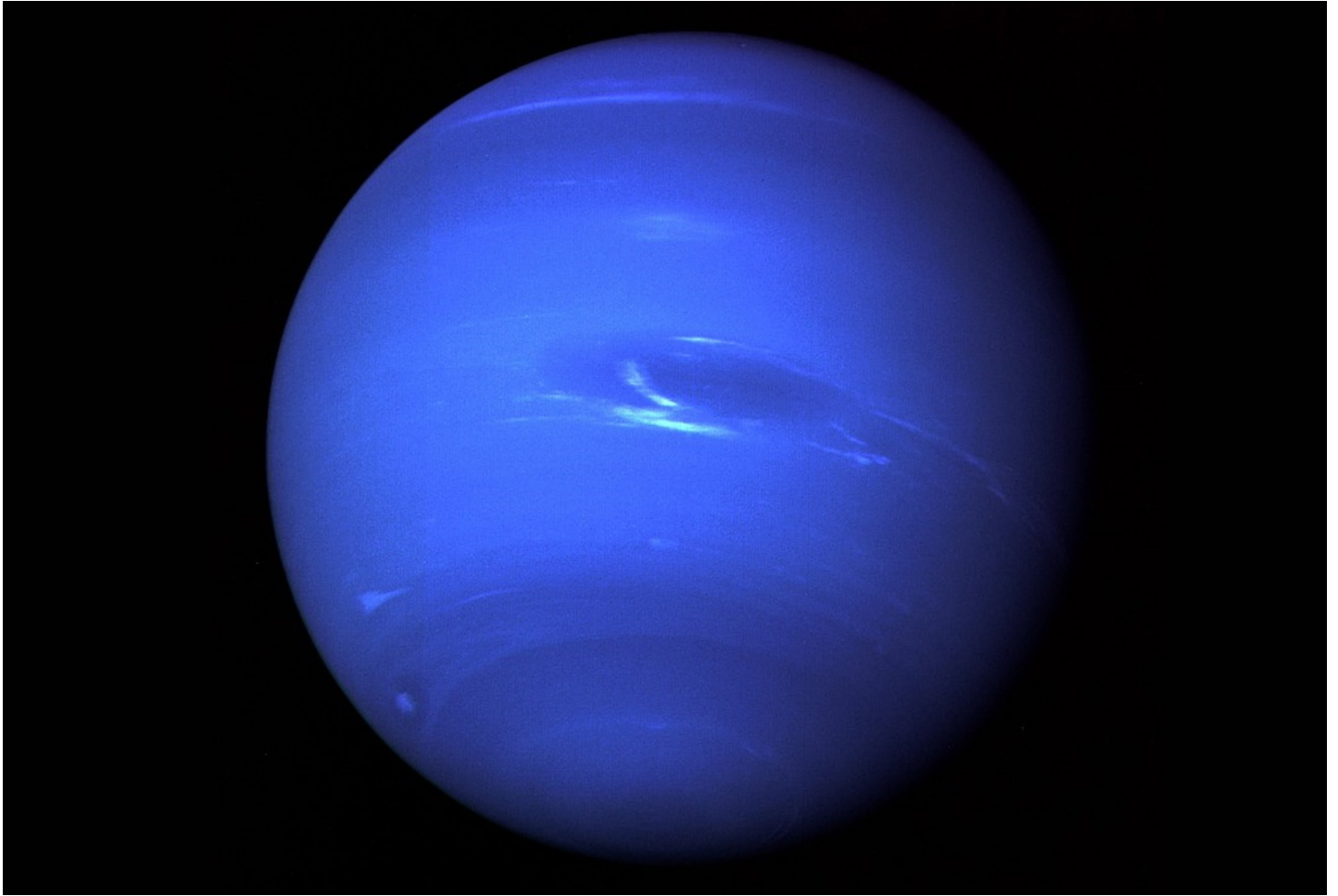


You can now find the latest [Scotland Sky Diary](#) for September by Alan Pickup in the [ASE Journal](#).

Have you ever observed Neptune?

1 September 2018

Categories: News



Jupiter, Saturn and Mars have all been on display this year but too low in the sky from Edinburgh to be easy to observe. Neptune is higher and an interesting challenge if you've never seen it before.

Neptune reaches opposition on 7 September and will be 27 degrees above the horizon from Edinburgh, higher than Jupiter, Saturn or Mars achieved. The size of the disc will only be 2.4" and magnitude 7.8, but you should be able to make out the tiny disc and its blue colour in a small telescope.



The chart shows Neptune at its highest point in the sky from Edinburgh at 01:14 BST on the morning of 7 September.

Its largest moon Triton is also visible in a medium size telescope with high magnification, but quite faint at mag. 13.5. If you have a camera and overexpose Neptune, that can help to show up the satellite better. Some amateurs have actually managed to detect some cloud features using fast frame-rate cameras and larger telescopes.

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

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September 2018 Meeting report

9 September 2018

Categories: Meeting report, News



We had a good start to the new season of ASE monthly meetings on Friday 7th September, with a fascinating talk by Dr. John Lightfoot of the ROE on Hubble's Variable Nebula.

Before the meeting, former President Seán Wixted handed over the medal of office to new President Andrew Farrow. Andrew becomes the 48th President of the ASE. Have a look at the list of distinguished [past Presidents of the ASE](#) from 1924 onwards.

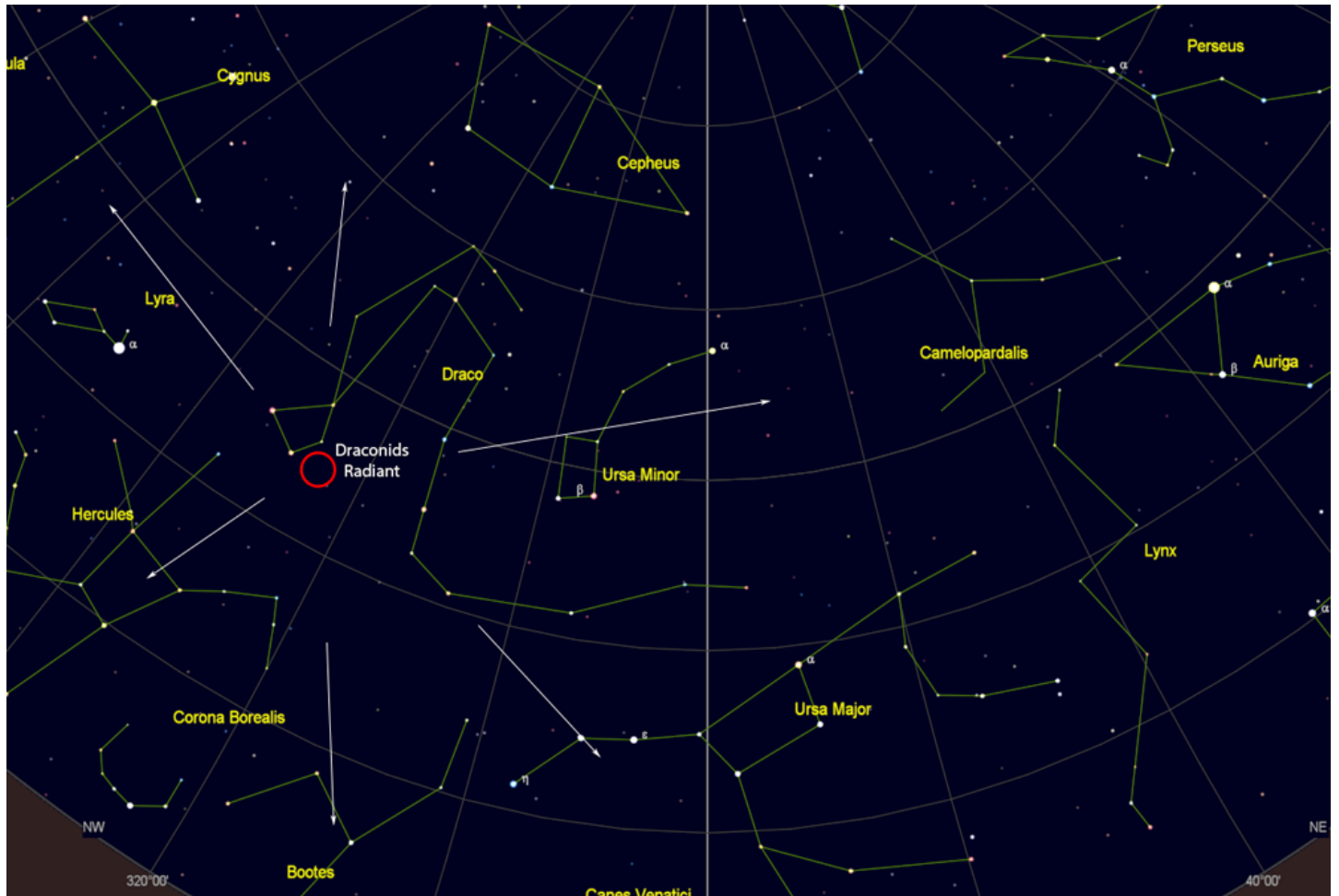
Also at the meeting:

- Welcome to 2 new members and any visitors, of which there were quite a few.
- An introduction to the new ASE website by Mark Phillips.
- After the main talk, Alan Pickup gave his guide to the [night sky in September](#).
- Seán Wixted covered various events that may happen over the next year, including a proposal to take part in celebrations to mark the 200th anniversary of the birth of Charles Piazzi Smyth.
- Andrew Farrow introduced a suggestion for a telescope "help shop" in February 2019, after people have bought new Christmas telescopes.
- Andrew also introduced some ideas for expanding the format of our monthly meetings.
- Hugh Somerville gave a presentation with pictures on some of his current interests.

2018 Draconid meteor shower – one to watch?

28 September 2018

Categories: News



The Draconid meteor shower is an annual event which usually produces low rates of about 10 meteors per hour on the 8-9 October. However, in some years, when its parent comet is close to perihelion, it can produce spectacular storms. This year *could* be one of those.

[Comet 21P/Giacobini-Zinner](#) is the comet responsible for the Draconids, also called the Giacobinids for that reason, and we have been keeping an eye on that comet for the past few months. It reached perihelion, its closest point to the Sun, on 10 September 2018, and so it is “possible” the Draconids may be more interesting this year. As always though it is very hard to predict what will actually happen, which is why we’re saying “could” and “may” and “possible”.

The shower produced spectacular, brief meteor storms twice in the last century, in 1933 and 1946. Recent outbursts occurred in 2011 (ZHR of 300) and 2012. There are predictions based on comparisons with the 2011 shower and the comet’s tail position, that it could produce a ZHR of 20-50 round about midnight on the night of 8-9 October 2018. The Moon is also new so won’t interfere at all.



The radiant is just to the right of the head of the constellation Draco. Draconid meteors are particularly slow moving (21 km/s) compared to other showers such as the Perseids (59 km/s) so they should be distinctive.

This could be a shower to watch – or not! Astronomy is full of surprises and disappointments, but in science a negative result is often as useful as a positive one, so keep watching.

If you manage to image or observe any Draconid meteors, why not post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Mark Phillips

Information source: [International Meteor Organisation](#)

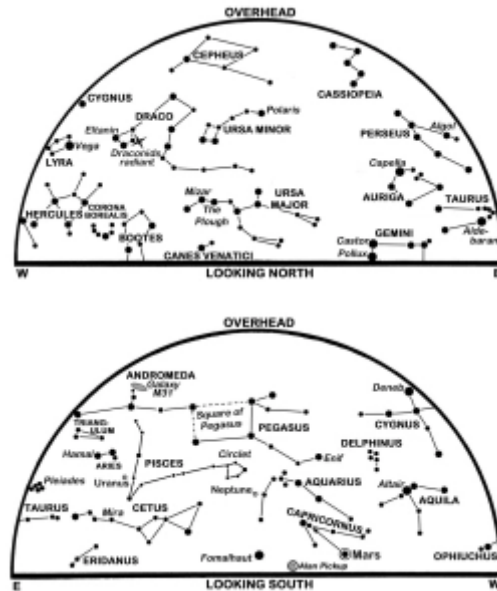
Scotland's Sky in October, 2018

29 September 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, Alcor, ASE, Astronomical Society of Edinburgh, BepiColombo, Comet Giacobini-Zinner, diary, Draco, Draconids, Halley's Comet

Draconid meteors glide away from the Dragon's head



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 28th when clocks are set back one hour to 01:00 GMT. (Click on map to enlarge)

Mars dominates our southern evening sky but most of the other bright planets are poorly placed this month. Even so, our October nights are full of interest, from the Summer Triangle in the evening to the star-fest around Orion before dawn.

Although Mars dims from magnitude -1.3 to -0.6, its reddish light remains prominent as it moves from low in the south-south-east at nightfall to the south-south-west at our map times and onwards to set in the south-west a little before 01:00 BST (midnight GMT). As its distance grows from 89 million to 118 million km, and its diameter shrinks from 16 to 12 arcseconds, the planet speeds through Capricornus to climb 6° northwards and that much higher in our sky. Catch it to the left of the Moon on the 17th and below-right of the Moon on the 18th.

The Sun tracks 11° southwards as Edinburgh's sunrise/sunset times change from 07:15/18:48 BST (06:15/17:48 GMT) on the 1st to 07:17/16:35 GMT on the 31st. The Moon is at last quarter on the 2nd, new on the 9th, at first quarter on the 16th, full (the Hunter's Moon) on the 24th and back at last quarter on the 31st.

Our charts show the Plough in the north as it moves below Polaris, the Pole Star. Mizar, in the Plough's handle, forms a famous double star with the fainter Alcor – the pair being separated by about one third the diameter of the Moon. Once held as a (not very rigorous) test of eyesight, they were dubbed "The Horse and Rider".

Both lie 83 light years (ly) from us although we can't be certain that they are tied together by gravity. In any case, we are not talking about just two stars, for Alcor has a faint companion and most telescopes show Mizar to be a binary

star – the first to be discovered telescopically in the 17th century. Spectroscopes reveal that each of Mizar’s components is itself binary, so Mizar and Alcor, if they are truly associated, together form a sextuplet star system.

Mizar is the same brightness, magnitude 2.2, as Eltanin which lies 14° to the right of Vega and very high in the west at nightfall, falling into the north-west overnight. It is the brightest star in Draco and a member of a quadrilateral that marks the head of the Dragon whose body and tail twist to end between the Plough and Polaris. It lies 154 ly away but is approaching the Sun and will pass within 28 ly in another 1.5 million years to become the brightest star in Earth’s night sky.

Meteors from the Draconids shower diverge from a radiant point that lies close to Draco’s head (see our north map) between the 7th and 10th. Don’t expect a major display – perhaps no more than 10 meteors per hour, though all of them are very slow as they glide away from the radiant. The shower’s peak is due in a moonless sky around midnight on the 8th-9th and is worth checking because some years surprise us with strong displays and the shower’s parent comet, Comet Giacobini-Zinner, was visible through binoculars when it swept within 59 million km last month.

A better-known comet, Halley, is responsible for the meteors of the Orionids shower which lasts from the 16th to the 30th and has a broad but not very intense peak of fast meteors between the 21st and 24th. The radiant point, between Orion and Gemini, rises in the east-north-east soon after our map times and passes high in the south before dawn. Sadly, the peak coincides with the full moon, so don’t expect much of a show.

From high in the south at nightfall, the Summer Triangle (Vega, Deneb and Altair) tumbles into our western sky by the map times. By then, the less impressive and rather empty Square of Pegasus is in the south and Taurus and the Pleiades star cluster are climbing in the east. Orion rises below Taurus over the next two hours and crosses the meridian as the night ends.

Neptune and Uranus, now well placed in the evening, may be located through binoculars using better charts than I can provide here. A web search, for example for “Neptune finder chart”, should help. Neptune shines at magnitude 7.8 and lies in Aquarius at a distance of 4,342 million km on the 1st. Uranus is 2,824 million km away in Aries, near its border with Pisces, when it stands opposite the Sun in the sky (opposition) on the 24th. Although the full Moon stands close to it on that day, its magnitude of 5.7 makes it just visible to the unaided eye under a good dark and moonless sky.

October should see the launch of the European Space Agency’s BepiColombo mission to Mercury, but the planet itself is too low in our evening twilight to be seen. Venus sweeps around the Sun’s near side at inferior conjunction on the 26th and remains hidden in the Sun’s glare.

Jupiter is bright (magnitude -1.8) but less than 8° high in the south-west at sunset as the month begins. One of our last chances of spotting it in our bright evening twilight comes on the 11th when it lies 4° below-left of the young earthlit Moon.

Saturn, magnitude 0.5 and edging eastwards in Sagittarius, stands less than 10° high above Edinburgh’s south-south-western horizon as the sky darkens and sets in the south-west some 45 minutes before our map times. Look for it to the left of the Moon on the 14th.

Diary for 2018 October

Times are BST until the 28th

2nd 11h Last Quarter

9th 00h Peak of Draconids meteor shower

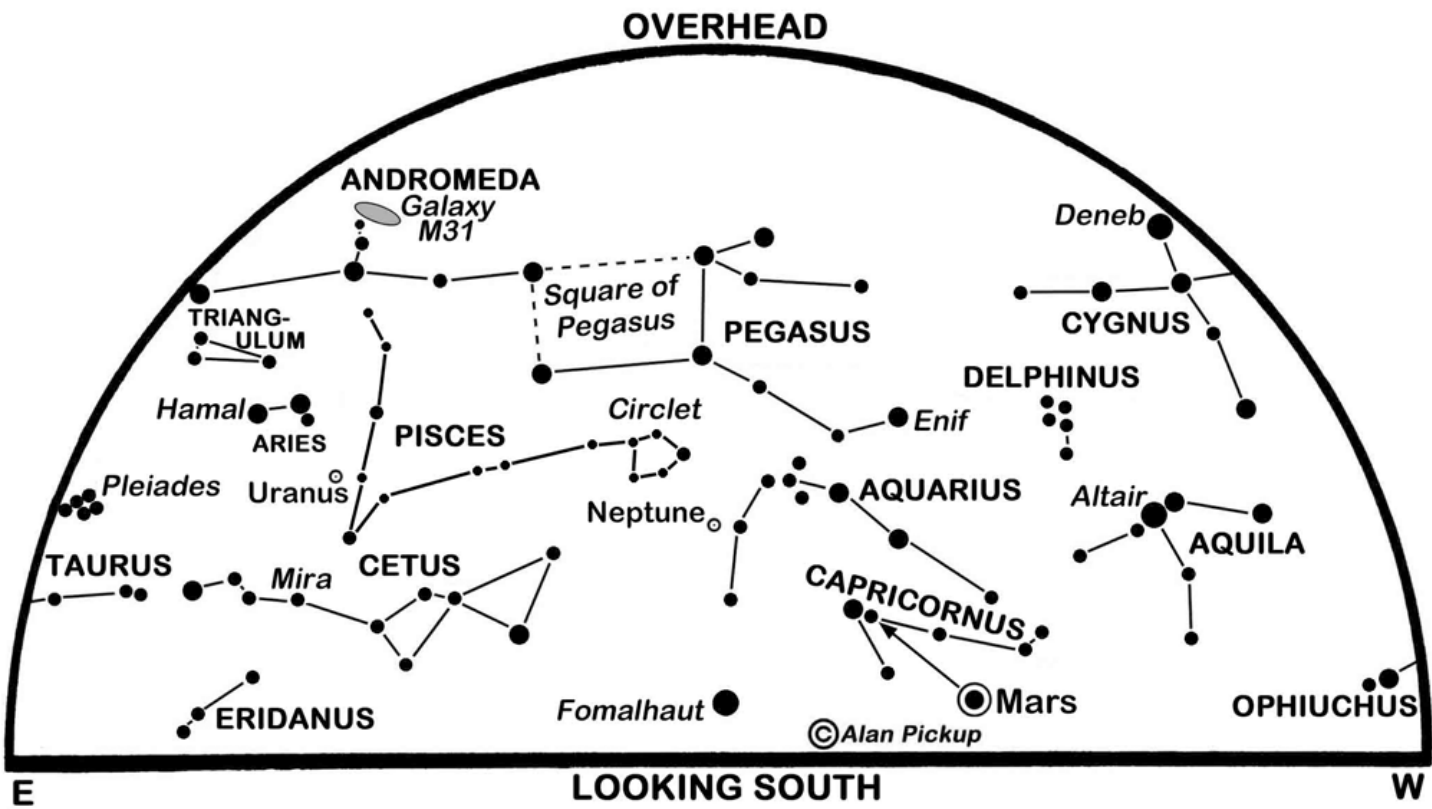
9th	05h New moon
11th	22h Moon 4° N of Jupiter
15th	04h Moon 1.8° N of Saturn
16th	19h First quarter
18th	14h Moon 1.9° N of Mars
21st – 24th	Peak of Orionids meteor shower
24th	02h Uranus at opposition at distance of 2,824m km
24th	18h Full moon
26th	15h Venus in inferior conjunction on Sun's near side
28th	02h BST = 01h GMT End of British Summer Time
31st	17h GMT Last quarter

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on September 29th 2018, with thanks to the newspaper for permission to republish here.

Scotland's Sky in October 2018

29 September 2018
Categories: News

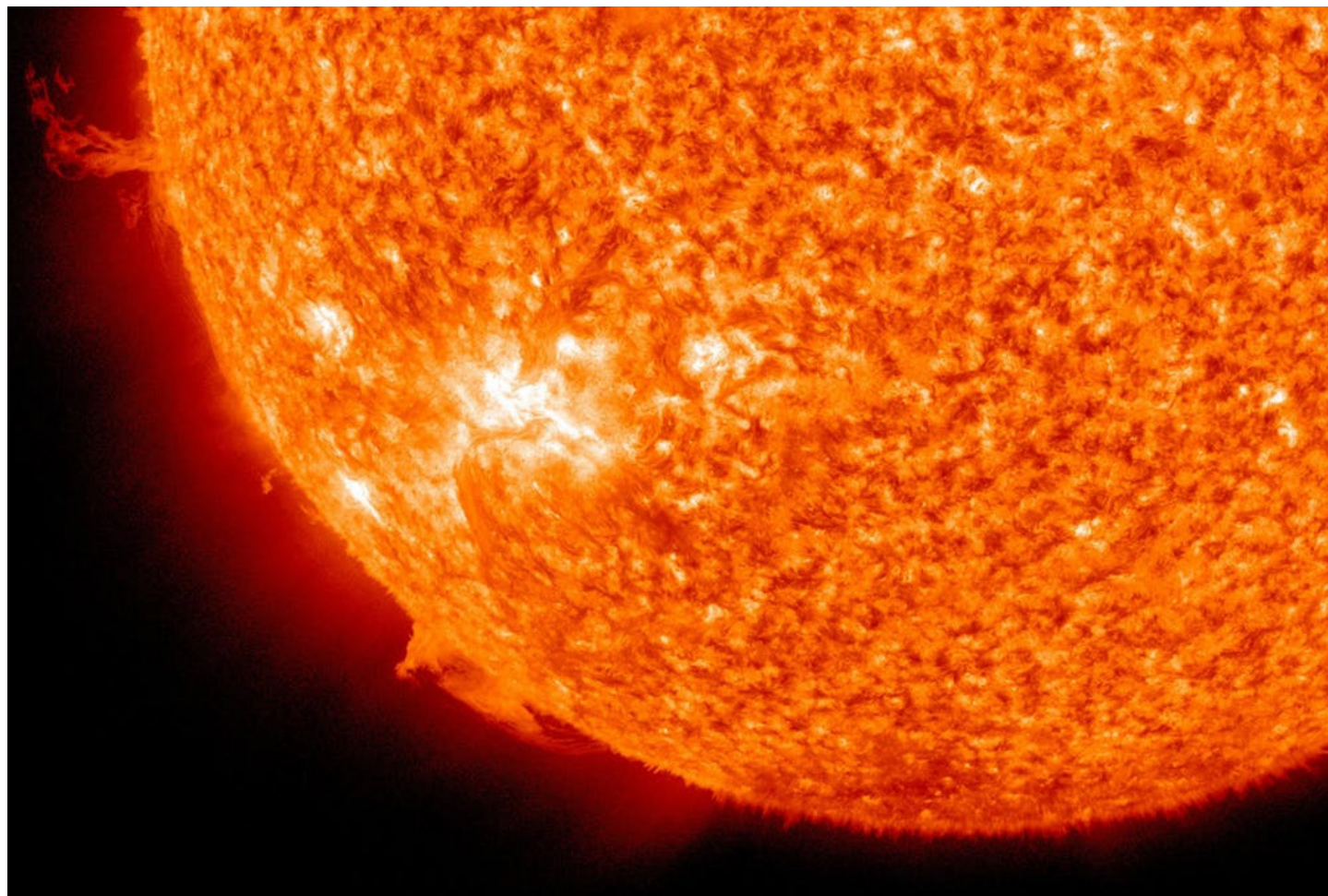


You can now find the latest [Scotland Sky Diary](#) for October by Alan Pickup in the [ASE Journal](#).

Welcome to visitors from the ROE Doors Open days

29 September 2018

Categories: News



If you're visiting our site as a result of meeting us at the ROE Doors Open days then this post is for you. Thank you for visiting us at the ROE and we hope you enjoyed your day there – we certainly did and got some solar observing in as well.

If you want to find out more about astronomy then feel free to come along to one of our monthly meetings. No knowledge of astronomy required, just an interest in the subject. Let us help you get started!

The next meeting is on **Friday 5th October at 7:30pm in Augustine United Church on George IV Bridge** and it's free – you don't have to be a member, just come along. The main talk will be about observing meteors but there will be other items such as what's in Edinburgh's night sky in October and a news update on all things astronomy and space. Hang around afterwards for tea, coffee and a chat to other astronomers who share your interest.

Keep an eye on our website for other news and events too. We plan to write an article on what telescope to buy – for your first scope or for Christmas – in the very near future. We are also planning to hold an event sometime in February on how to use your new telescope. Keep watching for more details.

We hope to see you at one of our meetings very soon.

Andrew Farrow, President

October 2018 meeting report

6 October 2018

Categories: Meeting report, News



Alex Pratt of the BAA kicked off our October meeting last night in Edinburgh with an interesting talk on meteor observing and recording.

Alex explained how you don't have to freeze with a deckchair and blanket to record meteors these days (unless of course you want to) by using automated video cameras with software techniques to analyse the data.

Also at the meeting:

- President Andrew Farrow welcomed 4 new members and 2 from last month
- We also welcomed visitors, some wanting to join the Society as a result of visiting us at the ROE Doors Open days and finding us online
- Alan Pickup gave his [monthly guide to the night sky in Edinburgh](#)
- Sean gave the Secretary's update (see below)
- There were offers of telescopes for sale and telescopes for loan to members
- Andrew Farrow introduced the first of a new regular feature – an overview of what's happening in the world of astronomy and space, covering topics that included: The Goblin discovery, Hyabusa-2, Parker Solar Probe, Japanese space elevator...
- There were 3 member presentations: Peter Black about the Imaging Group, Hugh Somerville on Iridium satellites, and Graham Rule on a "wandering" Lorimer Medal

A very interesting and varied evening of talks!

Our next meeting is on 2 November with a talk on METI Messaging Extraterrestrial Intelligence by Dr Alan Penny of St Andrews University. We hope to see you then.

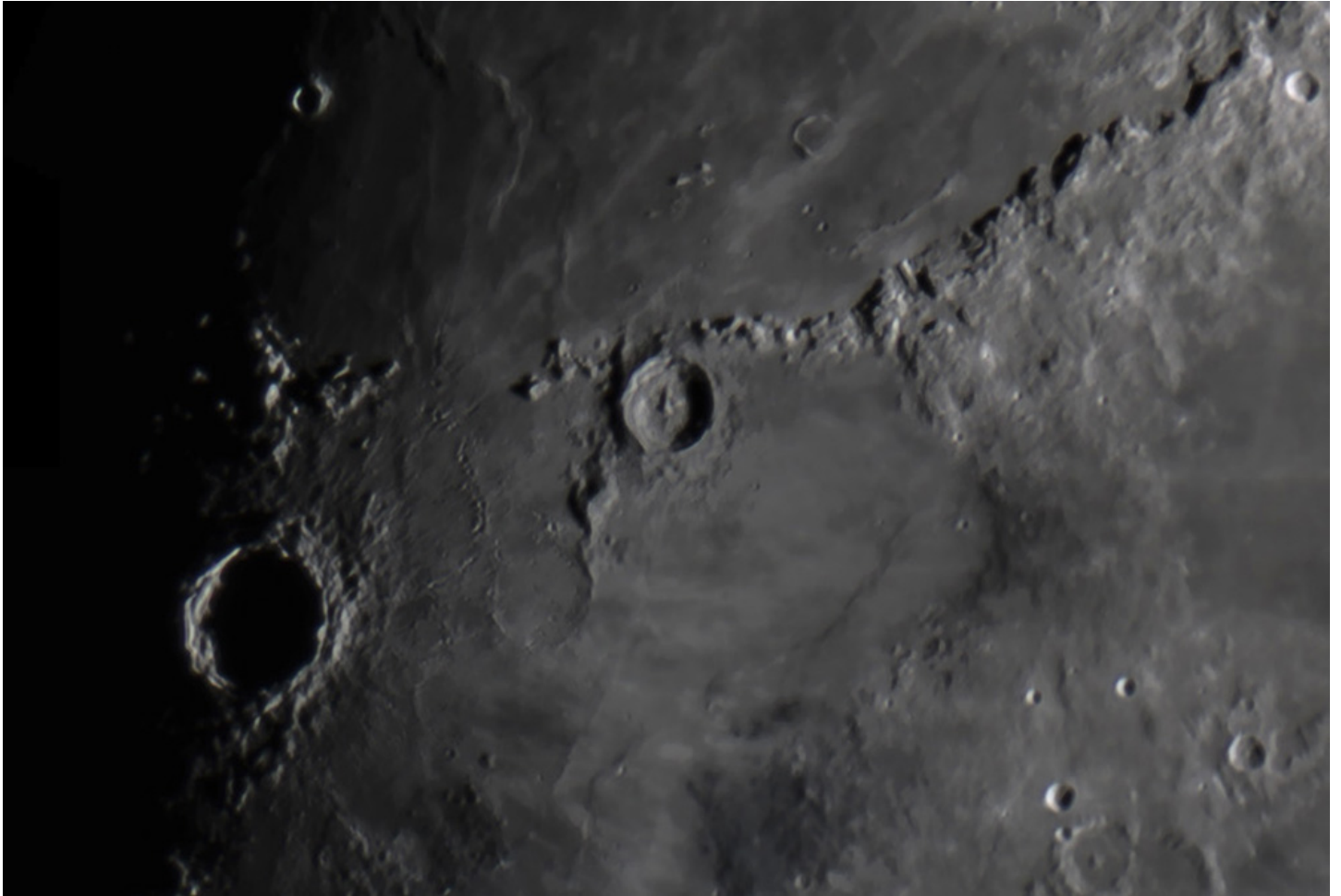
Secretary's update

- There's an evening with Astronaut Michael Foale on Monday 5 November at 7pm at Edinburgh University (Aikman Lecture Theatre George Square). Tickets online from £18
- Mexborough and Swinton Astronomical Society is having an Astrocon to mark its 40th Anniversary on Saturday 27 October
- The Royal Scottish Society of Arts is having a astronomy related talk on Monday 28th January 2019 at 7pm in the AUC. Professor Ken Rice will be speaking about "Finding planets around other stars". It is open to the public. Further details at: <https://www.rssa.org.uk/20190128.shtml>
- The author Neil Haggath has written a new self-published science fiction novel, *Moonsafe Red*. It is now available for Kindle, as well as in print. It can be bought from the Amazon Kindle Store for £3.99 www.amazon.co.uk/dp/B07GQ915G4
- The ASE now has a club section on the Stargazers Lounge forum. So anyone who uses the forum is encouraged to join that club section and contribute to it: <https://stargazerslounge.com/clubs/21-astronomical-society-of-edinburgh/>
- Scott Provan is selling his Meade LX200 10" telescope. If anyone is interested in buying it, get in touch and we'll put you in contact with him.

The Lunar 100

17 October 2018

Categories: Knowledge, News



The Moon is around for a good portion of every month so why not make the most of it. The Lunar 100 is to the Moon what the Messier catalogue is to deep sky objects.

I always find it useful to set myself little projects in order to *focus* (pun intended) my observing or imaging, otherwise I go outside and think “what shall I do now”. On [my own website](#) I set myself projects and targets, the Lunar 100 being one of them.

The [Lunar 100](#) was created by Planetary Scientist Charles A. Wood in the April 2004 edition of Sky and Telescope. It is a list of the most interesting Lunar features, arranged in order of difficulty, with L1 being the easiest (the Moon!) to L100 (Mare Marginis, only visible when libration allows). It contains interesting regions, craters, basins, mountains, rilles and domes that typify Lunar morphology.

Examples include:

- L5 Copernicus – Archetypal large complex crater
- L15 Straight Wall – Best example of a lunar fault
- L27 Archimedes – Large crater lacking central peak
- L66 Hadley Rille – Lava channel near Apollo 15 landing site
- ...see below for a full list

However you do it – observing, drawing or imaging, keep a record of what you do, even if it is only a *tick list*, so you can look back on it and return to some of the more interesting features again. Many features can be observed using small telescopes. Some of the later ones may require a larger (6 inch plus) instrument.

If you manage to image or observe any of the Lunar 100, why not post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Here is a list from [Wikipedia](#), with links to individual items, of the Lunar 100. To find the objects, use a Moon atlas such as the excellent and free [Virtual Moon Atlas Pro](#).

L	Feature Name	Significance	Lat. (°)	Long. (°)	Diam. (km)
L1	Moon	Large satellite	—	—	3.476
L2	Earthshine	Twice reflected sunlight	—	—	
L3	Mare/highland dichotomy	Two materials with distinct compositions	—	—	
L4	Apennines	Imbrium basin rim	18.9N	3.7W	70
L5	Copernicus	Archetypal large complex crater	9.7N	20.1W	93
L6	Tycho	Large rayed crater with impact melts	43.4S	11.1W	85
L7	Altai Scarp	Nectaris basin rim	24.3S	22.6E	425
L8	Theophilus , Cyrillus , Catharina	Crater sequence illustrating stages of degradation	13.2S	24.0E	—
L9	Clavius	Lacks basin features in spite of its size	58.8S	14.1W	225
L10	Mare Crisium	Mare contained in large circular basin	18.0N	59.0E	540
L11	Aristarchus	Very bright crater with dark bands on its walls	23.7N	47.4W	40
L12	Proclus	Oblique-impact rays	16.1N	46.8E	28
L13	Gassendi	Floor-fractured crater	17.6S	40.1W	101
L14	Sinus Iridum	Very large crater with missing rim	45.0N	32.0W	260
L15	Straight Wall	Best example of a lunar fault	21.8S	7.8W	110
L16	Petavius	Crater with domed and fractured floor	25.1S	60.4E	177
L17	Schröter's Valley	Giant sinuous rille	26.2N	50.8W	168
L18	Mare Serenitatis dark edges	Distinct mare areas with different compositions	17.8N	23.0E	N/A
L19	Alpine Valley	Lunar graben	49.0N	3.0E	165
L20	Posidonius	Floor-fractured crater	31.8N	29.9E	95
L21	Fracastorius	Crater with subsided and fractured floor	21.5S	33.2E	124
L22	Aristarchus Plateau	Mysterious uplifted region mantled with pyroclastics	26.0N	51.0W	150
L23	Pico	Isolated Imbrium basin-ring fragment	45.7N	8.9W	25
L24	Hyginus Rille	Rille containing rimless collapse pits	7.4N	7.8E	220
L25	Messier & Messier A	Oblique ricochet-impact pair	1.9S	47.6E	11
L26	Mare Frigoris	Arcuate mare of uncertain origin	56.0N	1.4E	1600
L27	Archimedes	Large crater lacking central peak	29.7N	4.0W	83
L28	Hipparchus	First drawing of a single crater	5.5S	4.8E	150
L29	Ariadaeus Rille	Long, linear graben	6.4N	14.0E	250
L30	Schiller	Possible oblique impact	51.9S	39.0W	180
L31	Taruntius	Young floor-fractured crater	5.6N	46.5E	56
L32	Arago Alpha & Beta	Volcanic domes	6.2N	21.4E	26
L33	Serpentine Ridge	Basin inner-ring segment	27.3N	25.3E	155
L34	Lacus Mortis	Strange crater with rille and ridge	45.0N	27.2E	152
L35	Triesnecker Rilles	Rille family	4.3N	4.6E	215

L36	Grimaldi basin	A small two-ring basin	5.5S 68.3W	440
L37	Bailly	Barely discernible basin	66.5S 69.1W	303
L38	Sabine and Ritter	Possible twin impacts	1.7N 19.7E	30
L39	Schickard	Crater floor with Orientale basin ejecta stripe	44.3S 55.3W	227
L40	Janssen Rille	Rare example of a highland rille	45.4S 39.3E	190
L41	Bessel ray	Ray of uncertain origin near Bessel	21.8N 17.9E	N/A
L42	Marius Hills	Complex of volcanic domes & hills	12.5N 54.0W	125
L43	Wargentín	A crater filled to the rim with lava or ejecta	49.6S 60.2W	84
L44	Mersenius	Domed floor cut by secondary craters	21.5S 49.2W	84
L45	Maurolycus	Region of saturation cratering	42.0S 14.0E	114
L46	Regiomontanus central peak	Possible volcanic peak	28.0S 0.6W	124
L47	Alphonsus dark spots	Dark-halo eruptions on crater floor	13.7S 3.2W	119
L48	Cauchy region	Fault, rilles and domes	10.5N 38.0E	130
L49	Gruithuisen Delta and Gamma	Volcanic domes formed with viscous lavas	36.3N 40.0W	20
L50	Cayley Plains	Light, smooth plains of uncertain origin	4.0N 15.1E	14
L51	Davy crater chain	Result of comet-fragment impacts	11.1S 6.6W	50
L52	Crüger	Possible volcanic caldera	16.7S 66.8W	45
L53	Lamont	Possible buried basin	4.4N 23.7E	106
L54	Hippalus Rilles	Rilles concentric to Humorum basin	24.5S 29.0W	240
L55	Baco	Unusually smooth crater floor and surrounding plains	51.0S 19.1E	69
L56	Australe basin	A partially flooded ancient basin	49.8S 84.5E	880
L57	Reiner Gamma	Conspicuous swirl and magnetic anomaly	7.7N 59.2W	70
L58	Rheita Valley	Basin secondary-crater chain	42.5S 51.5E	445
L59	Schiller–Zucchius basin	Badly degraded overlooked basin	56.0S 45.0W	335
L60	Kies Pi	Volcanic dome	26.9S 24.2W	45
L61	Mösting A	Simple crater close to center of lunar near side	3.2S 5.2W	13
L62	Rümker	Large volcanic dome	40.8N 58.1W	70
L63	Imbrium sculpture	Basin ejecta near and overlying Boscovich and Julius Caesar	11.0N 12.0E	—
L64	Descartes	Apollo 16 landing site; putative region of highland volcanism	11.7S 15.7E	48
L65	Hortensius domes	Dome field north of Hortensius	7.6N 27.9W	10
L66	Hadley Rille	Lava channel near Apollo 15 landing site	25.0N 3.0E	—
L67	Fra Mauro formation	Apollo 14 landing site on Imbrium ejecta	3.6S 17.5W	—
L68	Flamsteed P	Proposed young volcanic crater and Surveyor 1 landing site	3.0S 44.0W	112
L69	Copernicus secondary craters	Rays and craterlets near Pytheas	19.6N 19.1W	4
L70	Humboldtianum basin	Multi-ring impact basin	57.0N 80.0E	650
L71	Sulpicius Gallus dark mantle	Ash eruptions northwest of crater	19.6N 11.6E	12
L72	Atlas dark-halo craters	Explosive volcanic pits on the floor of Atlas	46.7N 44.4E	87
L73	Smythii basin	Difficult-to-observe basin scarp and mare	2.0S 87.0E	740
L74	Copernicus H	Dark-halo impact crater	6.9N 18.3W	5
L75	Ptolemaeus B	Saucer-like depression on the floor of Ptolemaeus	8.0S 0.8W	16
L76	W. Bond	Large crater degraded by Imbrium ejecta	65.3N 3.7E	158
L77	Sirsalis Rille	Procellarum basin radial rilles	15.7S 61.7W	425

L78	Lambert R	A buried “ghost” crater	23.8N 20.6W	54
L79	Sinus Aestuum	Eastern dark-mantle volcanic deposit	12.0N 3.5W	90
L80	Orientale basin	Youngest large impact basin	19.0S 95.0W	930
L81	Hesiodus A	Concentric crater	30.1S 17.0W	15
L82	Linné	Small crater once thought to have disappeared	27.7N 11.8E	2.4
L83	Plato craterlets	Crater pits at limits of detection	51.6N 9.4W	101
L84	Pitatus	Crater with concentric rilles	29.8S 13.5W	97
L85	Langrenus rays	Aged ray system	8.9S 60.9E	132
L86	Prinz Rilles	Rille system near the crater Prinz	27.0N 43.0W	46
L87	Humboldt	Crater with central peaks and dark spots	27.0S 80.9E	207
L88	Peary	Difficult-to-observe polar crater	88.6N 33.0E	74
L89	Valentine Dome	Volcanic dome	30.5N 10.1E	30
L90	Armstrong , Aldrin and Collins	Small craters near the Apollo 11 landing site	1.3N 23.7E	3
L91	De Gasparis Rilles	Area with many rilles	25.9S 50.7W	30
L92	Gyldén Valley	Part of the Imbrium radial sculpture	5.1S 0.7E	47
L93	Dionysius rays	Unusual and rare dark rays	2.8N 17.3E	18
L94	Drygalski	Large south-pole region crater	79.3S 84.9W	162
L95	Procellarum basin	The Moon’s biggest basin?	23.0N 15.0W	3200
L96	Leibnitz Mountains	Rim of South Pole-Aitken basin	85.0S 30.0E	—
L97	Inghirami Valley	Orientale basin ejecta	44.0S 73.0W	140
L98	Imbrium lava flows	Mare lava-flow boundaries	32.8N 22.0W	—
L99	Ina	D-shaped young volcanic caldera	18.6N 5.3E	3
L100	Mare Marginis swirls	Possible magnetic field deposits	18.5N 88.0E	—

Mark Phillips

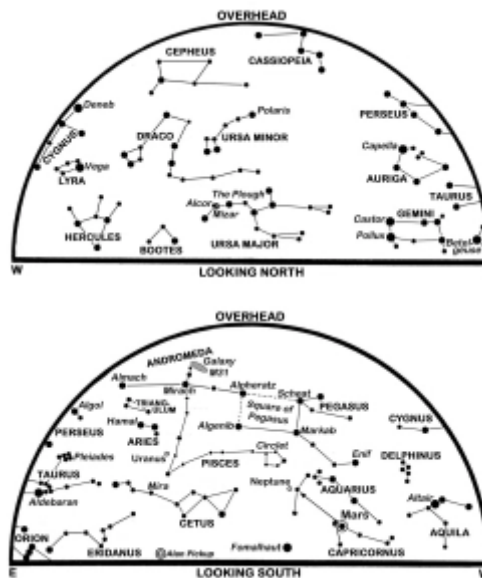
Scotland's Sky in November, 2018

31 October 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, Comet Tempel-Tuttle, diary, Draconids, Jupiter, Leonids, Mars, marsquakes

InSight probe to land on bright evening planet Mars



The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 30th. An arrow depicts the motion of Mars. (Click on map to enlarge)

The Summer Triangle, still high in the south at nightfall, shifts to the west by our map times as our glorious winter constellations climb in the east. Taurus with the Pleiades and its leading star Aldebaran (close to the Moon on the 23rd) stands well clear of the horizon while Orion is rising below and dominates our southern sky after midnight.

In the month that should see NASA's InSight lander touch down on its surface, the planet Mars continues as a prominent object in the south at nightfall. Venus springs into view as a spectacular morning star but we must wait to see whether the Leonids meteor shower, which has produced some storm-force displays in the past, gives us any more than the expected few meteors this year.

InSight is due to land on the 26th on a broad plain called Elysium Planitia that straddles Mars' equator. There it will place an ultra-sensitive seismometer directly onto the surface and cover it with a dome-like shell to shield it from the noise caused by wind and heat changes. This should be able to detect marsquakes and meteor impacts that occur all around Mars. Other InSight experiments will hammer a spike up to five metres into the ground to measure Mars' heat flow, and further investigate the planet's interior structure by using radio signals to track tiny wobbles in its rotation.

Until recently, Mars has remained low down as it performed a loop against the stars in the south-western corner of Capricornus. That loop, resulting entirely from our changing vantage point as the Earth overtook Mars and came within 58 million km on 31 July, took Mars more than 26° south of the sky's equator and 3° further south than the Sun stands at our winter solstice.

Now, though, Mars is climbing east-north-eastwards on a track that will take it further north than the Sun ever gets by the time it disappears into Scotland's night-long twilight next summer. One by-product of this motion is that Mars' setting time is remarkably constant over the coming months, being (for Edinburgh) within 13 minutes of 23:42 GMT from now until next May.

This month sees Mars leave Capricornus for Aquarius and shrink as seen through a telescope from 12 to 9 arcseconds as it recedes from 118 million to 151 million km. Its path, indicated on our southern chart, carries it 0.5° (one Moon's breadth) north of the multiple star Deneb Algedi, the goat's tail, on the 5th. It almost halves in brightness, from magnitude -0.6 to 0.0, but its peak altitude above Edinburgh's southern horizon early in the night improves from 16° to 25°, though by our map times it is sinking lower towards the south-west.

Mars is not our sole evening planet since Saturn shines at magnitude 0.6 low down in the south-west at nightfall. It is only a degree below-right of the young Moon on the 11th and sets more than 90 minutes before our map times. The two most distant planets, Neptune and Uranus, are also evening objects and may be glimpsed through binoculars at magnitudes 7.9 and 5.7 in Aquarius and Aries respectively.

Edinburgh's sunrise/sunset times vary from 07:19/16:32 on the 1st to 08:17/15:45 on the 30th. The Moon is new on the 7th, at first quarter and below-right of Mars on the 15th, full on the 23rd and at last quarter on the 30th.

Jupiter is hidden in the solar glare as it approaches conjunction on the Sun's far side on the 26th. Mercury stands furthest east of the Sun (23°) on the 6th but is also invisible from our northern latitudes.

Venus, though, emerges rapidly from the Sun's near side into our morning twilight where it stands to the left of the star Spica in Virgo. Shining brilliantly at magnitude -4.1, the planet rises in the east-south-east only 29 minutes before the Sun on the 1st. By the 6th, though, it rises 80 minutes before sunrise and stands 8° below and right of the impressively earthlit waning Moon. Venus itself is 58 arcseconds wide and 4% illuminated on that morning, its slender crescent being visible through binoculars. By the 30th, Venus rises four hours before the Sun, climbs to stand 23° high in the south-south-east at sunrise and appears as a 41 arcseconds and 25% sunlit crescent.

It is just as well that my previous note led on the usually neglected Draconids meteor shower because observers, at least those under clear skies, were thrilled to see it provide perhaps the best meteor show of 2018. For just a few hours around midnight on 8-9th October, the sky became alive with slow meteors at rates of up to 100 meteors per hour or more.

Leonid meteors arrive this month between the 15th and 20th, with the shower expected to hit its usually-brief peak at around 01:00 on the 18th. Although they flash in all parts of the sky, they diverge from a radiant point in the so-called Sickle of Leo which rises in the north-east before midnight and climbs high into the south before dawn. No Leonids appear before the radiant rises, but even with the radiant high in a dark sky we may see fewer than 20 per hour – all of them very swift and many of the brighter ones leaving glowing trains in their wake.

Leonid meteoroids come from Comet Tempel-Tuttle which orbits the Sun every 33 years and was last in our vicinity in 1998. There has not been a Leonids meteor storm since 2002 and we may be a decade or more away from the next one, or are we?

Diary for 2018 November

2nd	05h Moon 2.1° N of Regulus
6th	16h Mercury furthest E of Sun (23°)
7th	16h New moon
11th	16h Moon 1.5° N of Saturn

15th	15h First quarter
16th	04h Moon 1.0° S of Mars
18th	01h Peak of Leonids meteor shower
23rd	06h Full moon
23rd	22h Moon 1.7° N of Aldebaran
26th	07h Jupiter in conjunction with Sun
26th	20h InSight probe to land on Mars
27th	09h Mercury in inferior conjunction on Sun's near side
27th	21h Moon 0.4° S of Praesepe
30th	00h Last quarter

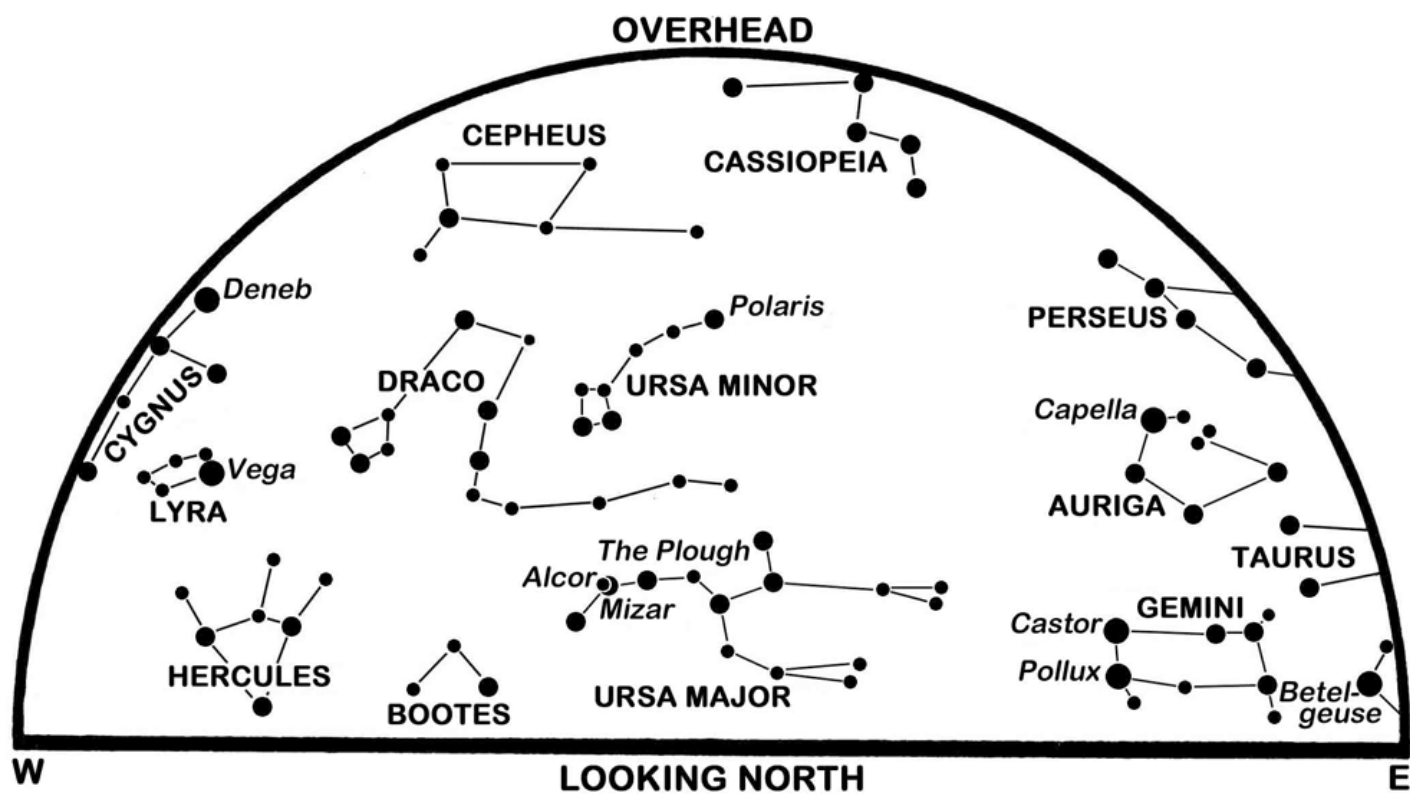
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on October 31st 2018, with thanks to the newspaper for permission to republish here.

Scotland's Sky in November 2018

31 October 2018

Categories: News

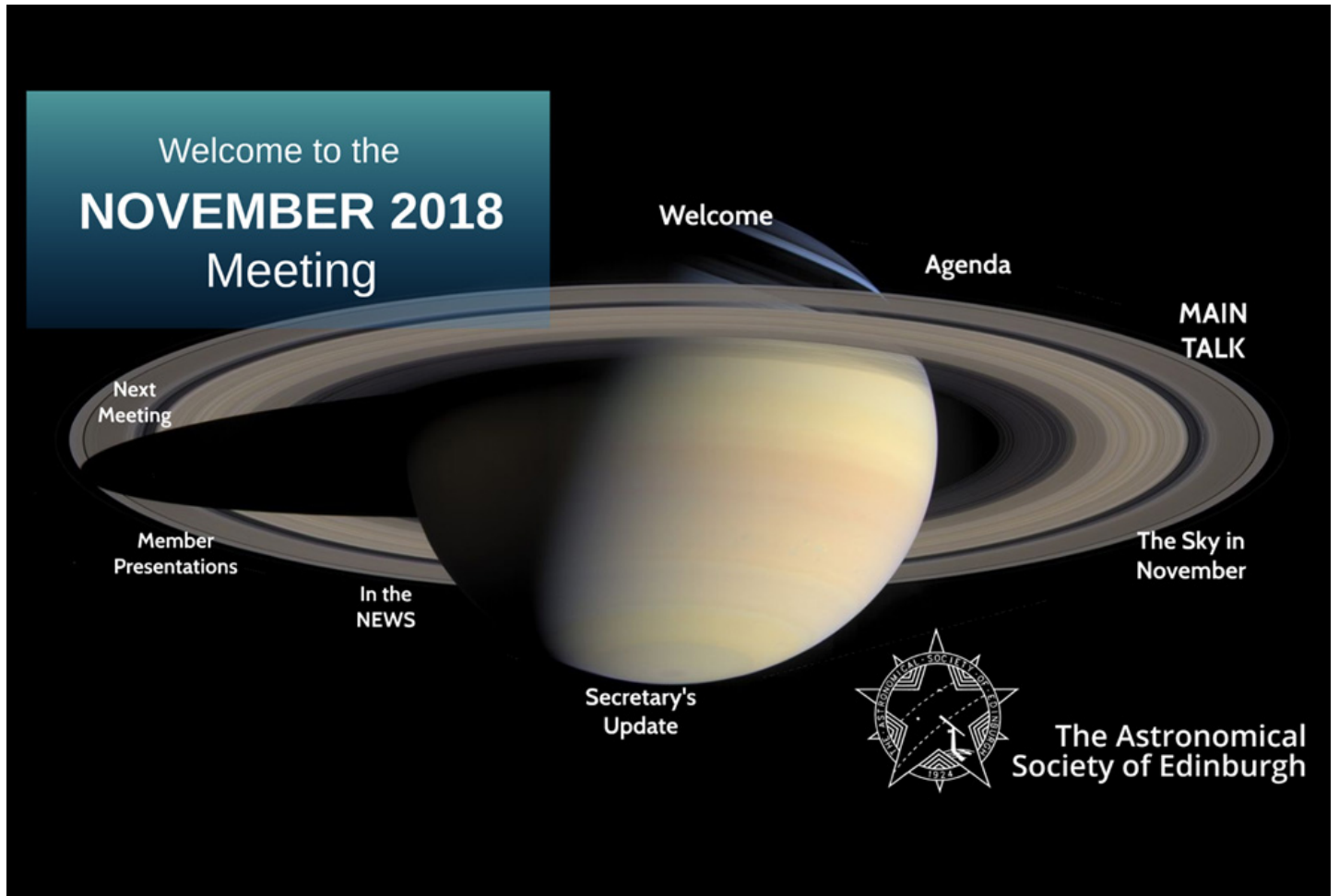


You can now find the latest [Scotland Sky Diary](#) for November by Alan Pickup in the [ASE Journal](#).

November 2018 meeting report

4 November 2018

Categories: Meeting report, News



Dr Alan Penny of the University of St Andrews struggled through illness to give a talk on METI: Messaging to Extraterrestrial Intelligence at our November 2018 meeting.

Also at the meeting:

- President Andrew Farrow welcomed 3 new members
- Horst Myerdierks gave his guide to Scotland's sky in November
- Sean gave his Secretary's update (see below)
- Andrew Farrow gave his overview of news in the Astronomy and Space world
- Hugh Somerville gave a presentation on various space-related topics

Our next meeting is on 7 December with a talk on "Hunting outbursting young star" by Dr Aleks Scholz of the University of St Andrews.

Secretary's Update

- Collective Gallery opening to the public Sat 24 November 2018 10:00 am
- One of our members Alistair Thomson has sadly passed away. Any members who knew him are invited to attend his funeral.

- We have been notified of the publication Occasional Notes by RA Marriott. Members are invited to subscribe and also submit articles.
www.hamaldemon.com
- Astro Publishing have a Free Astronomy Magazine
<https://www.astropublishing.com/> <https://www.facebook.com/astropublishing/>
- Subscriptions were due on 1 October. Membership will lapse if not received by end Jan 2019
- Our membership currently stands at 90
- We have created a [Buyer's Guide on which telescope to buy for Christmas](#) which will tie in with our Telescope Help Shop in February and a beginner observing list that is being prepared.

Winter's coming and the Pleiades are rising

18 November 2018

Categories: News



At this time of year the familiar sight of the Pleiades rising means that Winter's on its way. They're easy to observe with the naked eye or whatever optical instrument you have, but can be a little tricky to image.

M45 – the 45th object in Messier's catalogue, also known as the Pleiades or the Seven Sisters, are easy to find and visible with the naked eye. They are one of the best objects to wow your family and friends with through a telescope! To find them, follow the 3 stars of the belt of Orion up to the right to reach Aldebaran, the red eye of the bull in Taurus. Continue the line on a little further and you reach the Pleiades.

Most people can see 5, 6 or 7 stars with the naked eye but there are many more visible through binoculars or a telescope. In reality, there are probably over 1,000 stars associated with the cluster. Galileo Galilei was probably the first astronomer to view the Pleiades through a telescope and he reported on it in 1610.



Pleiades finder chart using Orion as guide

M45 is an [Open Cluster](#) containing mostly hot B-type stars (very luminous and blue-ish!) and lies 444 light years from Earth. Images show a blue reflection nebula around the cluster. It's likely that this is not actually associated with the cluster but simply a gas cloud that the cluster is currently passing through.

There are several reasons why the cluster can be tricky to image well:

1. It's a large cluster – about 110 arc minutes across (almost 4x the size of the Moon in the sky) and so it can be difficult to fit into your telescope-camera combination's field of view.
2. The main stars are bright – so with longer exposures the brighter stars can *burn out* and overpower the image, even causing stray reflections in the optical system.
3. The nebulosity is faint compared to the stars – so if you expose long enough to show the nebulosity, stars can get overbright and bloated in the image.



Pleiades star names

It's a balancing job to get imaging the Pleiades right, but when you do they are a very beautiful and rewarding subject.

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

*Article and banner image Mark Phillips
Charts from Cartes du Ciel and Stellarium*

Society Gift Memberships now available

22 November 2018

Categories: News



It's almost *that* time of year again and we've been asked for more Gift Memberships recently. Here's what to do if you want to buy one for someone.

Maybe it's for a friend or family member who's always been interested in astronomy but never done anything about it. This may be just the little push they need to take that step.

You can find all the details on our [Membership page](#).

The process is:

- get in touch to request a Gift Membership
- we will pass on payment details
- once payment has been received we will issue a Gift Certificate via email
- you can print that out and pass on as a gift
- the receiver should then fill out the membership form (see [Membership page](#))
- they can present the certificate to the Treasurer or other Council member at one of our monthly meetings

All memberships are subject to accepting the [Society's Constitution](#) (and being elected by the Council and membership).

Here are some of the benefits of membership:

- attend all meetings of the Society as well as the ordinary meetings
- be part of the Imaging Group and attend their meetings
- vote at the AGM and any Special Meetings that may be called
- take part in events organised by the society
- make short members presentations at ordinary meetings if desired
- be involved in any group observing sessions that may be organised
- get help and support from experienced amateur and professional astronomers
- access the member only area of the website
- borrow Society equipment when available (there's usually something available)
- access the Society library of books
- apply to become a Council member after 1 year of membership

We are a Society that is run by its members for its members, so this is not the same as a gift company would provide. Being a member allows you take part in whatever is going on and contribute to the Society.

Society members helping at school and Cubs

22 November 2018

Categories: News



Various members of the Society have been out and about recently sharing the wonders of the Universe with young people.

Des Loughney, Angus Self and Hugh Somerville went to Broomhouse Primary School to show some of the children the Moon at a specially organised evening event. Working with gaps in the clouds and with a few meteorites for added interest, they were able to keep them entertained and involved. They took along a few telescopes and showed them the Moon on a laptop connected to a camera and telephoto lens.

Winchburgh Cubs contacted us to ask if someone could bring along a telescope to help them complete their astronomy badges. So Tosh White and Mark Phillips went last Friday evening and were fortunate to have clear skies. They dragged a couple of telescopes out to the middle of a playing field and showed about 20 Cubs the Moon, providing them each with an outline chart to help them identify some of the features they would be seeing. The “oohs” and “ahhhs” as the children had their first views of the Moon through a telescope made it all so rewarding. The very varied, creative and interesting questions afterwards showed that they have a real interest in astronomy and the Universe.

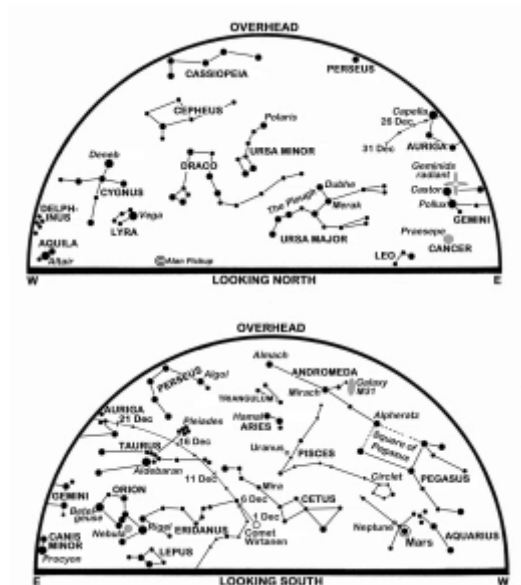
Scotland's Sky in December, 2018

30 November 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, Comet Wirtanen, diary, Geminids, Jupiter, Mars, Mercury, meteor shower

Comet sweeps near Earth as meteors streak from Gemini



The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 31st. Also indicated are the motions of both Mars and Comet Wirtanen. (Click on map to enlarge)

December brings our longest and perhaps most interesting nights of the year. The two stand-out planets are Mars in the evening and Venus before dawn, the latter now as brilliant as it ever gets and the source of a flurry of recent UFO reports. We may also enjoy the rich and reliable Geminids meteor shower and Comet Wirtanen looks set to be the brightest comet of the year.

The comet's progress is plotted on our charts, beginning low in the south near the Cetus-Eridanus border on the 1st and sweeping northwards and eastwards through Taurus to Auriga and beyond. A small comet with an icy nucleus possibly less than 1 km wide, Wirtanen was discovered in 1948 and orbits the Sun every 5.4 years between the Earth and Jupiter. It was the original destination of the European Space Agency's Rosetta mission before delays forced the probe to target Comet Churyumov-Gerasimenko instead.

Comet Wirtanen reaches perihelion, its closest to the Sun and just beyond the Earth's orbit, on the 12th. It is nearest the Earth on the 16th, passing only 11.6 million km away in the tenth closest approach of any observed comet since 1950. On that evening it lies 4° east (left) of the Pleiades and may appear as a large fuzzy ball lacking any obvious tail.

Predictions of its appearance at that time vary, but I suspect that its total brightness may be around the fourth magnitude, a little brighter than the fainter stars plotted on our charts. While this would normally put it well within naked-eye range, the fact that it is so close to the Earth is likely to mean that its light is spread out over an area even wider than the Pleiades. Unless we have a good dark sky, we may struggle to see its extended glow, and it is a pity

that the gibbous Moon (63% sunlit) will also hinder observations before midnight. Only a week later, on the evening of the 23rd, it lies only 1° east-south-east of the bright star Capella but will be fading in still brighter moonlight.

The Sun reaches its most southerly point at the winter solstice at 22:23 GMT on the 21st as sunrise/sunset times for Edinburgh change from 08:19/15:44 GMT on the 1st to 08:42/15:40 on the 21st and 08:44/15:48 on the 31st. The Moon is new on the 7th, at first quarter on the 15th, full on the 22nd and at last quarter on the 29th.

Our charts show Andromeda and its Galaxy high in the south as Orion stands proudly in the south-east below Taurus and the Pleiades. Castor lies above Pollux in Gemini in the east and is close to the point in the sky that marks the radiant of the Geminids meteor shower.

The Geminids always produce an abundance of slow bright meteors which streak in all parts of the sky as they diverge from the radiant. The latter climbs to pass high in the south at around 02:00 and sinks into the west before dawn. The shower is active from the 8th to the 17th with the night of 13th-14th expected to be the best as meteor rates build to a peak at around dawn. An observer under an ideal dark sky with the radiant overhead may count upwards of 100 meteors per hour making the Geminids the highest-rated of our annual showers, though most of us under inferior skies may glimpse only a fraction of these.

Mars shines brightly some 25° high in the south as night falls for Edinburgh at present and is almost 10° higher by the month's end after moving east-north-eastwards from Aquarius into Pisces. Our maps have it sinking in the south-west on its way to setting in the west before midnight. Although the brightest object in its part of the sky, it dims from magnitude 0.0 to 0.5 as it recedes from 151 million to 189 million km. When Mars stands above the Moon on the 14th, a telescope shows its ochre disk to be only 8 arcseconds across.

Saturn, magnitude 0.6, hangs just above our south-western horizon at nightfall as December begins but is soon lost in the twilight. Our other two evening planets, Uranus and Neptune, are visible through binoculars at magnitudes of 5.7 and 7.9 in Pisces and Aquarius respectively. Mars acts as an excellent guide on the evening of the 7th when Neptune stands about one quarter of a Moon's breadth below-right of Mars.

Venus, now at its best as a dazzling morning star, rises in the east-south-east four hours before the Sun and climbs towards the south by dawn. This month it dims slightly from magnitude -4.7 to -4.5 as it tracks away from Virgo's brightest star Spica in Virgo into the next constellation of Libra. Telescopes shows its crescent shrink from 40 to 26 arcseconds in diameter. Look for Venus below-left of the Moon on the morning of the 3rd and to the Moon's right on the 4th.

Mercury is set to become as a morning star very low in the south-east and is soon to be joined by the even brighter Jupiter. Mercury rises more than 100 minutes before the Sun from the 5th to the 24th and stands between 5° and 9° high forty minutes before sunrise. It shines at magnitude 0.8 when it lies 7° below-left of the impressively earthlit Moon on the 5th, and triples in brightness to magnitude -0.4 by the 24th.

Jupiter, conspicuous at magnitude -1.8, emerges from the twilight and moves from 9° below-left of Mercury on the 11th to pass 0.9° south of Mercury on the 21st.

Diary for 2018 December

3rd	19h Moon 4° N of Venus
5th	21h Moon 1.9° N of Mercury
7th	07h New moon
7th	15h Mars 0.04° N of Neptune
9th	06h Moon 1.1° N of Saturn

12th	23h Comet Wirtanen closest to Sun (158m km)
14th	08h Peak of Geminids meteor shower
14th	23h Moon 4° S of Mars
15th	11h Mercury furthest W of Sun (21°)
15th	12h First quarter
16th	13h Comet Wirtanen closest to Earth (11.6m km) and 3.6° SE of Pleiades
20th	02h Jupiter 5° N of Antares
21st	08h Moon 1.7° N of Aldebaran
21st	15h Mercury 0.9° N of Jupiter
21st	22:23 Winter solstice
22nd	18h Full moon
23rd	18h Comet Wirtanen 0.9° SE of Capella
25th	05h Moon 0.3° S of Praesepe in Cancer
29th	10h Last quarter

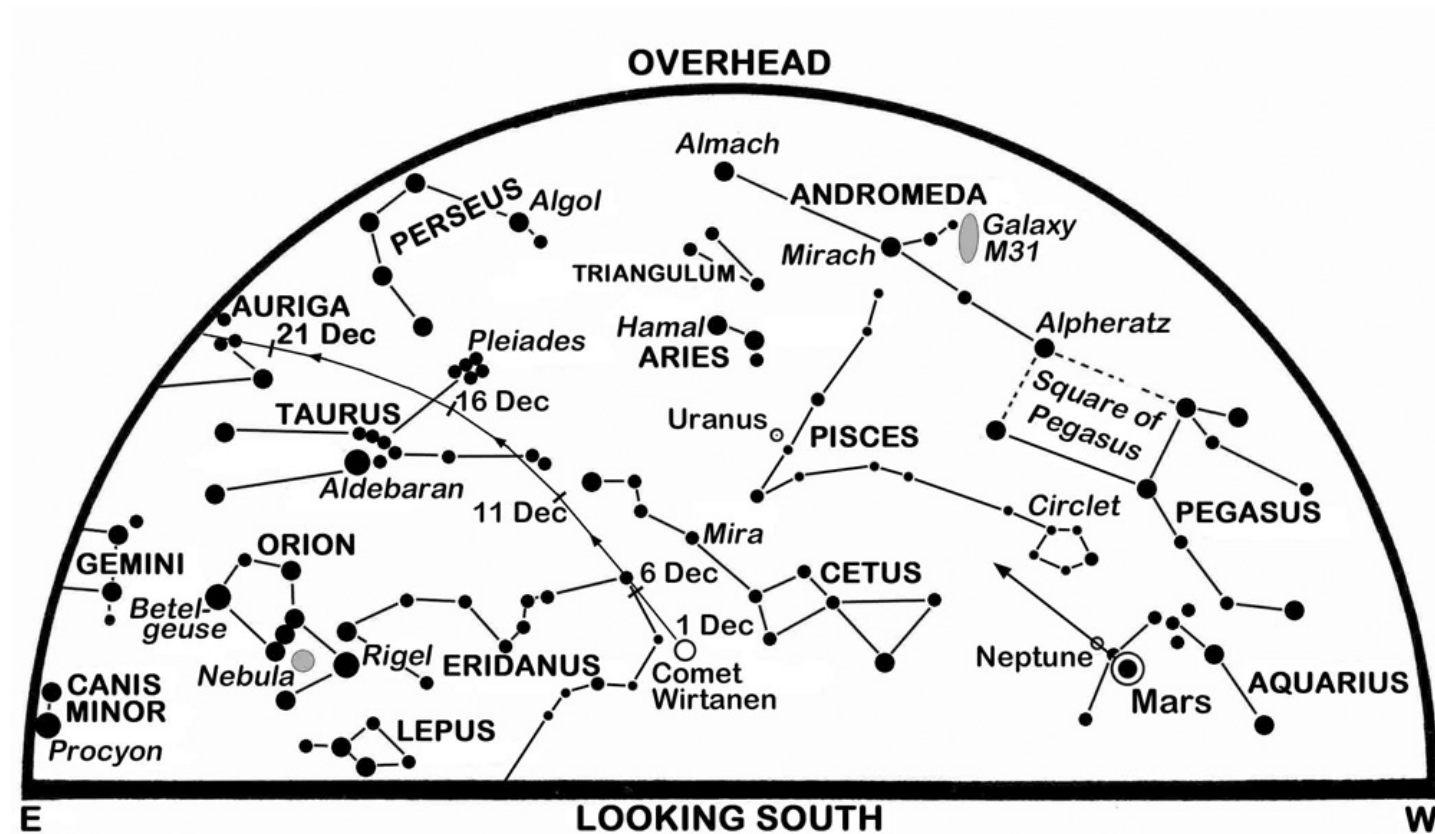
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on November 30th 2018, with thanks to the newspaper for permission to republish here.

Scotland's Sky in December 2018

30 November 2018

Categories: News



You can now find the latest [Scotland Sky Diary](#) for December by Alan Pickup in the [ASE Journal](#).

Get ready for the Geminid meteor shower

3 December 2018

Categories: News



The reliable Geminid meteor shower peaks on the night of 13/14 December. In 2018 the 34% Moon conveniently sets by about 10pm on 13 December to leave a dark sky for observing them.

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.

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 on 13 December, just after Moon-set, when Gemini is about 40 degrees altitude in the east, Orion is dominating the south-east and the bright star Capella in Auriga is high overhead.



Geminids radiant at 10pm 13 December

The Geminds, 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*

December 2018 meeting report

10 December 2018

Categories: Meeting report, News



We had a very engaging and colourful meeting this month, with Dr Aleks Scholz from the University of St Andrews telling us about Making Stars and Planets: the HOYS-CAPS Citizen Science Project.

This is a project where amateurs can make a real contribution – in fact without them this project may not even function. So consider taking part in it if you are an astro-imager. The project relies on as many observers as possible around the world imaging specific objects in the sky, to avoid bad weather interfering with continuous monitoring. More details on the [HOYS-CAPS project page](#).

Also at the meeting:

- President Andrew Farrow welcomed 5 new members this month
- Horst Myerdierts gave an overview of what's in our sky in December
- Secretary Sean Wixted gave his update (see below)
- Andrew Farrow covered various current topics in the world of astronomy and space
- Andrew gave an overview of the Charles Piazzi Smyth 200th anniversary celebrations that we will be getting involved with, including providing some funding
- Andrew also covered the re-opening of the Calton Hill observatory and opportunities for the Society
- Tosh White and David Small gave short presentations on a new observatory build and a strange lighting effect at sunset



Secretary's Update

Curious Kats Adventure Club offering a 4 day trip to Baikonur in Kazakhstan from Tue 2 April 2019 for an exciting and educational trip to the world's largest space launch facility. For £2000 per person as an early bird fee.

Highlights include:

We'll witness the roll-out of the spacecraft, A unique view of the launch of the rocket itself, Sightseeing in Baikonur city, Visit Baikonur cosmodrome museum and the international space school, A cosmodrome tour, visiting the facilities and tools that were used for space exploration in the past, A trip to the Buran spacecraft, Visiting the houses of Yuri Gagarin & Sergei Korolev

Invitation to the Astronomical Society of Glasgow public lecture

Next public lecture which takes place on Thursday 20th December, when Prof John Brown, Astronomer Royal for Scotland, Astronomy and Astrophysics Group, University of Glasgow, will be presenting "Black Holes, Black Magic and Interstellar Travel: How General Relativity Could Help Santa Span the Galaxy".

Room RC667 of the Royal College, University of Strathclyde at 7.30 pm. The room can be found by entering via the James Weir Building on Montrose Street.

It would be helpful if you could let me know how many of your members intend to come along. If possible, can you please do this by 9 December.

Telescope Help Shop

9 February 2019 3-6pm, St Thomas's Church, Gyle Hall, Costorphine, ALL tickets allocated
Setting up new telescopes, Beginner observing list, Need telescope experienced volunteers to help

Charles Piazzi Smyth 200th Anniversary

Prof. Andy Lawrence is leading a series of projects which we have agreed to support

Piazzi-Smyth Symposium in Edinburgh

Two and a half days on topics relating to his work and legacy

Exhibition at the Nelson Monument

opening in April as part of Science festival but remaining open

video, stereographic displays

historical story and science behind his achievements

2016 screening of "Un Lugar Sobre Las Nubes"

documents 1856 expedition to Tenerife

panel discussion on scientific issues raised

Sound and Light: Time gun and the Moon

collaborative science project for public and local schools

measuring speed of sound and distance to the moon

recreate Time Gun map

use of lunar laser ranging dataset (Apollo 11 anniversary)

Public Talks Highland and Island Tour

Six public talks planned on legacy of CPS

Four in Edinburgh

Caithness, Galloway, Lewis and Highland region

ROE Archive and publicity project

Conserving, cataloguing and digitising CPS Archives
for public use and enjoyment

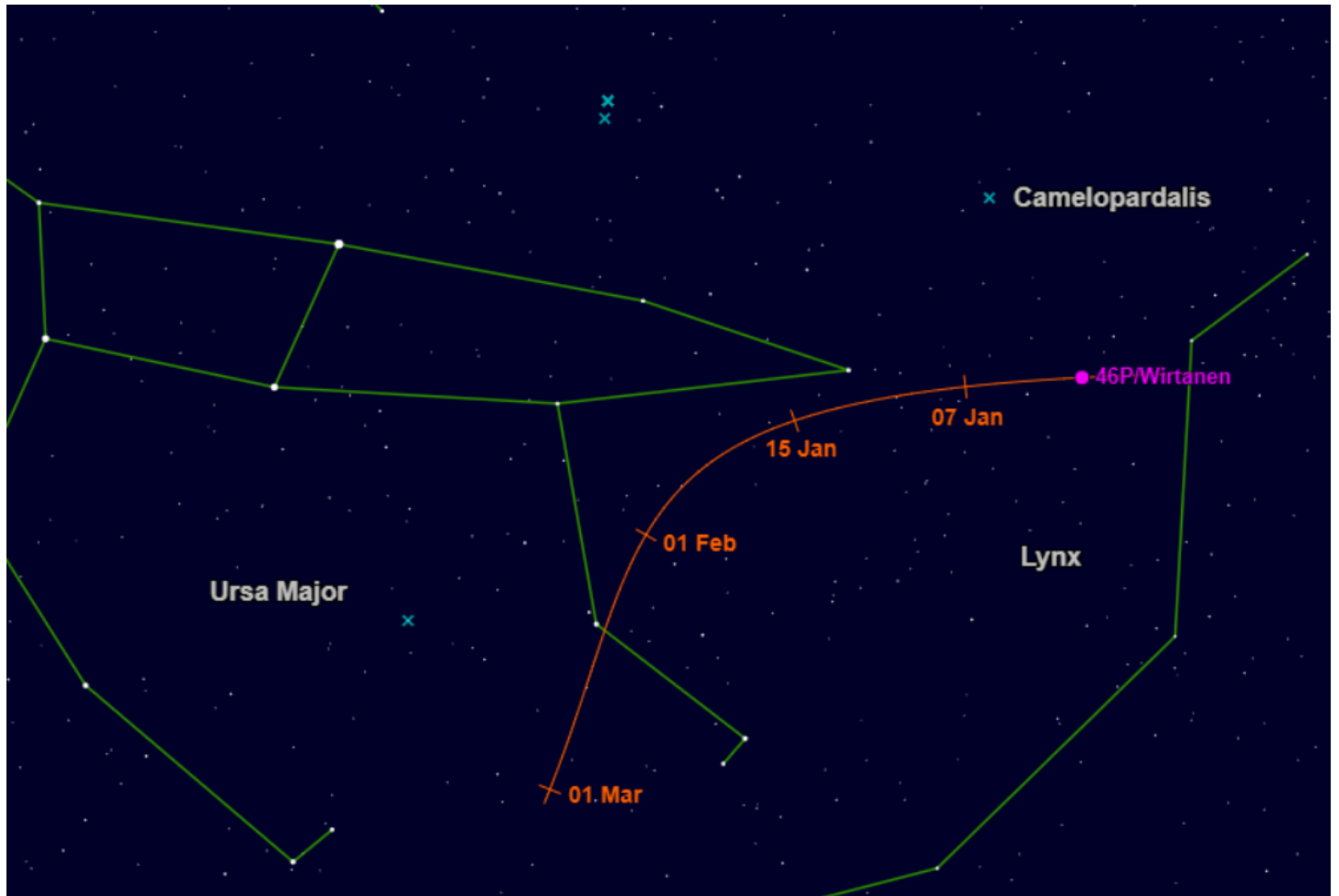
The society has agreed to support this with a grant of £4000

Peter Black will lead our involvement particularly around the exhibition
Interested members will not pay registration fee to Symposium
ASE credited as sponsor on documentation, film and other material
ASE will keep CPS Exhibition film for future use.

UPDATED: Comet 46P/Wirtanen in December

15 December 2018

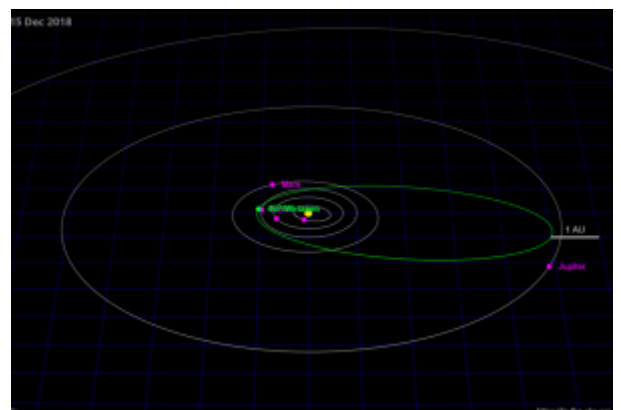
Categories: News



Periodic comet 46P/Wirtanen *may* be a naked eye object in December, rising above the Edinburgh horizon to provide an interesting Winter spectacle.

The comet only rises high enough in Edinburgh early in December, but will then become well-placed for observation as it rises higher and passes through Eridanus, Cetus, Taurus, Perseus and Auriga in the rest of the month.

The comet is periodic with an orbital period of 5.43 years. Its closest point to the Sun is at 1.06 AU and furthest point of 5.43 AU, just inside the orbit of Jupiter. The fact that it does come so close to Jupiter means that its [orbit has changed significantly](#) since its discovery in 1948, due to perturbations caused by Jupiter.



46P orbit 15 Dec 2018

Reality is often different from the predicted – sometimes there are outbursts as a comet heats up approaching the Sun, at other times they simply fizzle out as damp squibs. This can make comets interesting objects to observe when you get the rare chance. Some predictions show it brightening to mag. 3.3, others show it going no brighter than mag. 6.

There is a [dedicated campaign](#) about the 2018 apparition of this comet because it *could* be interesting.

Why could it be interesting?

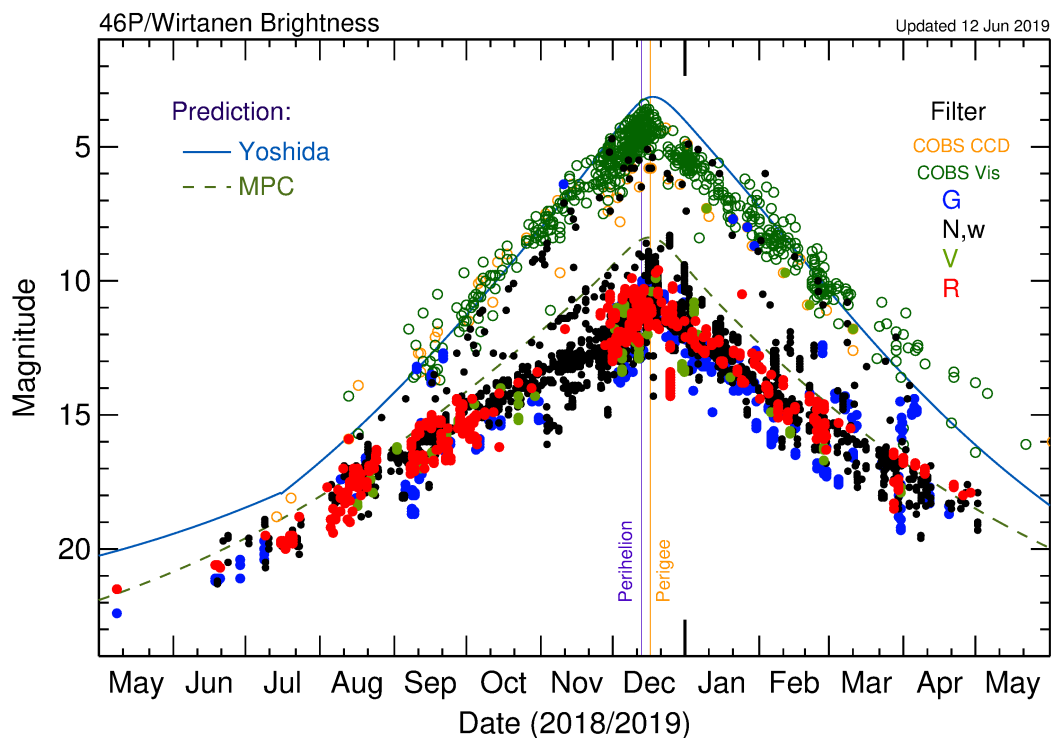
- It makes a very close approach to Earth (for a comet), 4 days after perihelion when it is at it's brightest
- Despite being small, it is an inherently bright and hyperactive comet
- It will remain visible to us for a decent amount of the night (weather permitting!)

Here's a reason why it's difficult to predict comet brightness, taken from the campaign page:

"The problem for comet Wirtanen (and other close approachers) is that, as it gets closer and closer to the Earth, its coma gets spread out over a bigger and bigger area of the sky. Consider that at closest approach, the physical scale is only 57 km/arcsec, so the coma, which extends hundreds of thousands of kilometers from the nucleus, may be spread over many degrees on the sky. How this affects its appearance depends on exactly how the gas and dust are distributed spatially around the nucleus. More centrally condensed material (e.g., dust) will not be spread out on the sky as the more diffuse gas contribution. Unfortunately, not only is little known about the comet, but its approach to the Earth is historically close, so we don't have the knowledge to predict how these factors will impact the comet's ultimate brightness. Thus, even if Wirtanen does reach a total magnitude ~ 3 , it's possible that the light may be too spread out to see with the naked eye."

Whatever actually happens, it should be worth watching!

Brightness reports so far from the [campaign page](#). The two lines are for the different ways of measuring brightness.



HOYS-CAPS: the project that needs amateur astronomers

18 December 2018

Categories: News



It's often said that astronomy is one of the few sciences where amateurs can still make a valuable contribution. When it comes to HOYS-CAPS, the project wouldn't exist without us!

[HOYS-CAPS](#), which stands for Hunting Outbursting Young stars with the Centre of Astrophysics and Planetary Sciences, is a project run from the University of Kent by Dr Dirk Froebrich, started in 2014. The aim is to study the formation of stars and terrestrial planets in the disks surrounding young stars. It does this by collecting photometric data of clusters in star forming regions younger than 10 million years and within 1kpc of us.

I found our December talk by Dr Aleks Scholz of the University of St Andrews fascinating, so much so that within a few days, and after a few email conversations with Dr Froebich, I had submitted my first two data sets. It's interesting that the HOYS-CAPS project depends on amateurs providing the bulk of the data, supported by a number of professional and university observatories, including St Andrews.

HOYS-CAPS has a list of about 20 target objects that are regularly monitored by participants around the world. The intention of this *distributed monitoring* is to remove as many data gaps as possible due to bad weather. Our normal amateur instrumentation is very suitable for the task: a reasonable sized telescope and an astronomical camera with an appropriate filter – normal imaging RGB or H-alpha filters are fine. The techniques are also what astro-imagers would be used to: take a number of frames of the same object, stack them, calibrate with dark, bias and flat frames, and then upload the final image to a [specially developed web interface](#) where it can be analysed automatically.

Objects include old favourites such as the Orion, Rosette, Pelican and Cocoon nebulae. So if you're imaging these already then it's a relatively simple task to format and re-purpose the data for the HOYS-CAPS project. In fact I submitted the raw red channel image of M42 at the top of this article, having taken it during a normal imaging session.

The project hopes to recruit more amateurs and has embarked on giving a number of talks to societies around the country to raise awareness. If you want to keep up to date with the project then you can join the [HOYS-CAPS Facebook group](#) and maybe even consider getting involved... the project does depend on the likes of us after all!

Article by Mark Phillips

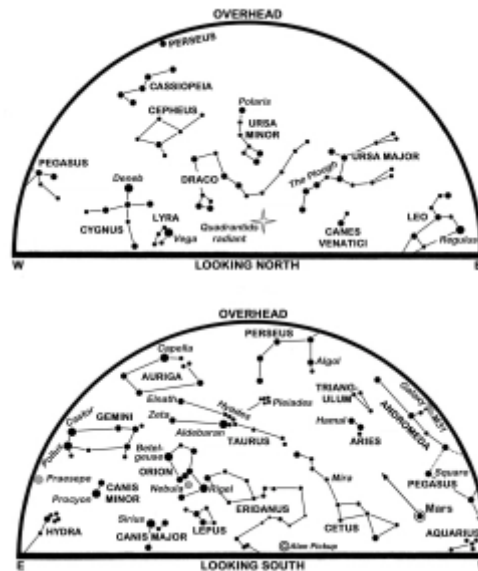
Scotland's Sky in January, 2019

31 December 2018

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, Chang'e 4, diary, Gemini, Jupiter, lunar eclipse, Mars, Mercury

Rise early for a total lunar eclipse on the 21st



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. (Click on map to enlarge)

Any month that has the glorious constellation of Orion in our southern evening sky is a good one for night sky aficionados. Add one of the best meteor showers of the year, a total eclipse of the Moon, a meeting between the two brightest planets and a brace of space exploration firsts and we should have a month to remember

Orion rises in the east as darkness falls and climbs well into view in the south-east by our star map times. Its two leading stars are the blue-white supergiant Rigel at Orion's knee and the contrasting red supergiant Betelgeuse at his opposite shoulder – both are much more massive and larger than our Sun and around 100,000 times more luminous.

Below the middle of the three stars of Orion's Belt hangs his Sword where the famous and fuzzy Orion Nebula may be spied by the naked eye on a good night and is usually easy to see through binoculars. One of the most-studied objects in the entire sky, it lies 1,350 light years away and consists of a glowing region of gas and dust in which new stars and planets are coalescing under gravity.

The Belt slant up towards Taurus with the bright orange giant Aldebaran and the Pleiades cluster as the latter stands 58° high on Edinburgh's meridian. Carry the line of the Belt downwards to Orion's main dog, Canis Major, with Sirius, the brightest star in the night sky. His other dog, Canis Minor, lies to the east of Orion and is led by Procyon which forms an almost-equilateral triangle with Sirius and Betelgeuse – our so-called Winter Triangle.

The Moon stands about 15° above Procyon when it is eclipsed during the morning hours of the 21st. The event begins at 02:36 when the Moon lies high in our south-western sky, to the left of Castor and Pollux in Gemini, and its left edge starts to enter the lighter outer shadow of the Earth, the penumbra.

Little darkening may be noticeable until a few minutes before it encounters the darker umbra at 03:34. Between 04:41 and 05:46 the Moon is in total eclipse within the northern half of the umbra and may glow with a reddish hue as it is lit by sunlight refracting through the Earth's atmosphere. The Moon finally leaves the umbra at 06:51 and the penumbra at 07:48, by which time the Moon is only 5° high above our west-north-western horizon in the morning twilight.

This eclipse occurs with the Moon near its perigee or closest point to the Earth so it appears slightly larger in the sky than usual and may be dubbed a supermoon. Because the Moon becomes reddish during totality, there is a recent fad for calling it a Blood Moon, a term which has even less of an astronomical pedigree than supermoon. Combine the two to get the frankly ridiculous description of this as a Super Blood Moon.

Sunrise/sunset times for Edinburgh change from 08:44/15:49 on the 1st to 08:10/16:43 on the 31st. New moon early on the 6th, UK time, brings a partial solar eclipse for areas around the northern Pacific. First quarter on the 14th is followed by full moon and the lunar eclipse on the 21st and last quarter on the 27th.

The Quadrantids meteor shower is active until the 12th but is expected to peak sharply at about 03:00 on the 4th. Its meteors, the brighter ones leaving trains in their wake, diverge from a radiant point that lies low in the north during the evening but follows the Plough high into our eastern sky before dawn. With no moonlight to hinder observations this year, as many as 80 or more meteors per hour might be counted under ideal conditions.

Mars continues as our only bright evening planet though it fades from magnitude 0.5 to 0.9 as it recedes. Tracking through Pisces and well up in the south at nightfall, it stands above the Moon on the 12th. Our maps show it sinking in the south-west and it sets in the west before midnight.

Venus, its brilliance dimming only slightly from magnitude -4.5 to -4.3, stands furthest west of the Sun (47°) on the 6th and is low down (and getting lower) in our south-eastern predawn sky. Look for it below and left of the waning Moon on the 1st with the second-brightest planet, Jupiter at magnitude -1.8, 18° below and to Venus's left. As Venus tracks east-south-eastwards against the stars, it sweeps 2.4° north of Jupiter in an impressive conjunction on the morning of the 22nd while the 31st finds it 8° left of Jupiter with the earthlit Moon directly between them.

Saturn, magnitude 0.6, might be glimpsed at the month's end when it rises in the south-east 70 minutes before sunrise but Mercury is lost from sight as it heads towards superior conjunction on the Sun's far side on the 30th.

China hopes that its Chang'e 4 spacecraft will be the first to touch down on the Moon's far side, possibly on the 3rd. Launched on December 7 and named for the Chinese goddess of the Moon, it needs a relay satellite positioned beyond the Moon to communicate with Earth.

Meantime, NASA's New Horizons mission is due to fly within 3,500 km of a small object a record 6.5 billion km away when our New Year is barely six hours old. Little is known about its target, dubbed Ultima Thule, other than that it is around 30 km wide and takes almost 300 years to orbit the Sun in the Kuiper Belt of icy worlds in the distant reaches of our Solar System.

Diary for 2019 January

- | | |
|-----|---|
| 1st | 06h New Horizons flyby of Ultima Thule |
| 1st | 22h Moon 1.3° N of Venus |
| 2nd | 06h Saturn in conjunction with Sun |
| 3rd | 05h Earth closest to Sun (147,100,000 km) |
| 3rd | 08h Moon 3° N of Jupiter |

4th	03h Peak of Quadrantids meteor shower
6th	01h New moon and partial solar eclipse
6th	05h Venus furthest W of Sun (47°)
12th	20h Moon 5° S of Mars
14th	07h First quarter
17th	19h Moon 1.6° N of Aldebaran
21st	05h Full moon and total lunar eclipse
21st	16h Moon 0.3° S of Praesepe
22nd	06h Venus 2.4° N of Jupiter
23rd	02h Moon 2.5° N of Regulus
27th	21h Last quarter
30th	03h Mercury in superior conjunction
31st	00h Moon 2.8° N of Jupiter
31st	18h Moon 0.1° N of Venus

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on December 31st 2018, with thanks to the newspaper for permission to republish here.

Ephemeris for 21P/Giacobini-Zinner

Date			Age of	Right	Declination	Rise	Culm	Set	Approx	Observable	Co
			Moon	Ascension					Mag.	(hover mouse)	
2018	Sep	09	28 days	05 ^h 44 ^m 51 ^s	+35°45'34"	20:58	07:33	18:04	8.0	00:55 until 05:00	Aur
2018	Sep	09	28 days	05 ^h 45 ^m 25 ^s	+35°32'22"	21:03	07:34	18:00	8.0	00:57 until 05:00	Aur
2018	Sep	09	28 days	05 ^h 45 ^m 59 ^s	+35°19'21"	21:08	07:34	17:57	8.0	00:59 until 05:00	Aur
2018	Sep	09	29 days	05 ^h 46 ^m 33 ^s	+35°06'19"	21:12	07:35	17:53	8.0	01:01 until 05:00	Aur
2018	Sep	09	29 days	05 ^h 47 ^m 07 ^s	+34°53'16"	21:17	07:35	17:50	8.0	01:02 until 05:00	Aur
2018	Sep	09	29 days	05 ^h 47 ^m 41 ^s	+34°40'12"	21:21	07:36	17:47	8.0	01:04 until 05:00	Aur
2018	Sep	09	29 days	05 ^h 48 ^m 14 ^s	+34°27'08"	21:25	07:36	17:44	8.0	01:06 until 05:00	Aur
2018	Sep	09	00 days	05 ^h 48 ^m 47 ^s	+34°14'02"	21:29	07:37	17:41	8.0	01:08 until 05:00	Aur
2018	Sep	10	00 days	05 ^h 49 ^m 21 ^s	+34°01'06"	21:29	07:34	17:35	8.0	01:05 until 05:02	Aur
2018	Sep	10	00 days	05 ^h 49 ^m 54 ^s	+33°47'50"	21:32	07:34	17:32	8.0	01:07 until 05:02	Aur
2018	Sep	10	00 days	05 ^h 50 ^m 26 ^s	+33°34'43"	21:36	07:35	17:29	8.0	01:09 until 05:02	Aur
2018	Sep	10	00 days	05 ^h 50 ^m 59 ^s	+33°21'35"	21:40	07:35	17:27	8.0	01:11 until 05:02	Aur
2018	Sep	10	00 days	05 ^h 51 ^m 32 ^s	+33°08'27"	21:43	07:36	17:24	8.0	01:12 until 05:02	Aur
2018	Sep	10	00 days	05 ^h 52 ^m 04 ^s	+32°55'18"	21:47	07:36	17:22	8.0	01:14 until 05:02	Aur
2018	Sep	10	01 days	05 ^h 52 ^m 36 ^s	+32°42'08"	21:50	07:37	17:20	8.0	01:16 until 05:02	Aur
2018	Sep	10	01 days	05 ^h 53 ^m 08 ^s	+32°28'58"	21:53	07:37	17:17	8.0	01:17 until 05:02	Aur
2018	Sep	11	01 days	05 ^h 53 ^m 41 ^s	+32°15'56"	21:52	07:34	17:11	8.0	01:15 until 05:04	Aur
2018	Sep	11	01 days	05 ^h 54 ^m 12 ^s	+32°02'37"	21:56	07:34	17:09	8.0	01:17 until 05:04	Aur
2018	Sep	11	01 days	05 ^h 54 ^m 43 ^s	+31°49'25"	21:59	07:35	17:07	8.0	01:18 until 05:04	Aur
2018	Sep	11	01 days	05 ^h 55 ^m 14 ^s	+31°36'13"	22:02	07:35	17:05	8.0	01:20 until 05:04	Aur
2018	Sep	11	01 days	05 ^h 55 ^m 46 ^s	+31°23'01"	22:05	07:36	17:03	8.0	01:22 until 05:04	Aur

Ephemeris for **46P/Wirtanen**

Date			Age of	Right	Declination	Rise	Culm	Set	Approx	Observable	Const
			Moon	Ascension					Mag.	(hover mouse)	
2019	Jan	03	26 days	08 ^h 01 ^m 31 ^s	+59°08'21"	Circumpolar			5.8	17:30 until 06:34	Lynx
2019	Jan	03	26 days	08 ^h 02 ^m 43 ^s	+59°10'16"	Circumpolar			5.8	17:30 until 06:34	Lynx
2019	Jan	03	27 days	08 ^h 03 ^m 54 ^s	+59°12'07"	Circumpolar			5.8	17:30 until 06:34	Lynx
2019	Jan	03	27 days	08 ^h 05 ^m 05 ^s	+59°13'54"	Circumpolar			5.8	17:30 until 06:34	Lynx
2019	Jan	03	27 days	08 ^h 06 ^m 15 ^s	+59°15'35"	Circumpolar			5.8	17:30 until 06:34	Lynx
2019	Jan	03	27 days	08 ^h 07 ^m 25 ^s	+59°17'13"	Circumpolar			5.8	17:30 until 06:34	Lynx
2019	Jan	03	27 days	08 ^h 08 ^m 33 ^s	+59°18'45"	Circumpolar			5.8	17:30 until 06:34	Lynx
2019	Jan	04	27 days	08 ^h 09 ^m 22 ^s	+59°21'08"	Circumpolar			5.9	17:31 until 06:34	Lynx
2019	Jan	04	27 days	08 ^h 10 ^m 49 ^s	+59°21'38"	Circumpolar			5.9	17:31 until 06:34	Lynx
2019	Jan	04	27 days	08 ^h 11 ^m 56 ^s	+59°22'58"	Circumpolar			5.9	17:31 until 06:34	Lynx
2019	Jan	04	27 days	08 ^h 13 ^m 02 ^s	+59°24'15"	Circumpolar			5.9	17:31 until 06:34	Lynx
2019	Jan	04	28 days	08 ^h 14 ^m 07 ^s	+59°25'27"	Circumpolar			5.9	17:31 until 06:34	Lynx
2019	Jan	04	28 days	08 ^h 15 ^m 12 ^s	+59°26'35"	Circumpolar			5.9	17:31 until 06:34	Lynx
2019	Jan	04	28 days	08 ^h 16 ^m 16 ^s	+59°27'40"	Circumpolar			5.9	17:31 until 06:34	Lynx
2019	Jan	04	28 days	08 ^h 17 ^m 20 ^s	+59°28'41"	Circumpolar			6.0	17:31 until 06:34	Lynx
2019	Jan	05	28 days	08 ^h 18 ^m 04 ^s	+59°30'33"	Circumpolar			6.0	17:32 until 06:34	Lynx
2019	Jan	05	28 days	08 ^h 19 ^m 25 ^s	+59°30'32"	Circumpolar			6.0	17:32 until 06:34	Ursa M
2019	Jan	05	28 days	08 ^h 20 ^m 27 ^s	+59°31'22"	Circumpolar			6.0	17:32 until 06:34	Ursa M
2019	Jan	05	28 days	08 ^h 21 ^m 28 ^s	+59°32'09"	Circumpolar			6.0	17:32 until 06:34	Ursa M
2019	Jan	05	29 days	08 ^h 22 ^m 28 ^s	+59°32'52"	Circumpolar			6.0	17:32 until 06:34	Ursa M
2019	Jan	05	29 days	08 ^h 23 ^m 28 ^s	+59°33'33"	Circumpolar			6.0	17:32 until 06:34	Ursa M

Mark Phillips

Information sources: Dominic Ford in-the-sky.org
The Comet Wirtanen Observing Campaign