Sky notes

2004 October & November

by Neil Bone

Sun and Moon

Sunspot cycle 23 continues to bring occasional large active areas during its declining phase. A major spot group rotated into view in the third week of July, and was associated with vigorous solar flare activity which triggered some low-latitude aurora. Observers following sunspot activity by the safe projection method should find one or two active areas on the disk on most days. For many, of course, viewing opportunities are now becoming restricted as the Sun heads southwards along the ecliptic and the days grow shorter.

Conversely, the nights grow longer, and with the return of Greenwich Mean Time to the civil clock on Sunday October 31 (Hallowe'en!), night-time observing can get underway that much earlier.

The Moon is New on October 14 and November 12, placing the darkest night-time conditions in the middle fortnight of the month. Full Moon falls on October 28 and November 26, with bright skies unsuitable for observing faint objects for several nights to either side.

At October's New Moon, a partial solar eclipse will be visible from northeast Asia and the northern Pacific region. No part of the event will be seen from Europe, but we are well placed to observe the total lunar eclipse at Full Moon on October 28. This will, however, entail a late-night stint: observers may choose to stay up late on Wednesday–Thursday of October 27–28 to catch it, or rise very early on Thursday morning.

Tracking eastwards relative to the star background, the Moon makes first contact with the central dark cone (the umbra) of Earth's shadow at 01h 14m Universal Time (UT=GMT, BST minus 1 hour; first contact is thus at 02h 14m BST). Soon after this time, a growing dark 'notch' will be apparent on the Moon's more easterly limb. The Moon travels eastwards by about its own diameter in an hour, and takes until 02h 23m UT to become completely immersed in the umbra.

As it becomes more fully immersed, the Moon in eclipse typically takes on a coppery-red hue, remaining visible but considerably dimmed from its fully-sunlit appearance. The relative brightness and colour of the totally-eclipsed Moon depend largely on the state of Earth's atmosphere: the red glow is a result of sunlight being refracted through the atmosphere to the Moon. If the atmosphere has a heavy dust load (after a volcanic eruption, say) or a lot of cloud, the eclipsed Moon can appear more grey and becomes very dim.

The year's earlier eclipse, on May 4, was comparatively dark. No two lunar eclipses are ever quite the same, and it will be interesting to see how the October 28 event compares. The totally-eclipsed Moon makes an attractive photographic target, and can be captured in exposures of a couple of seconds' duration at f/2 to f/4 on ISO 400 colour film, using a 135mm telephoto lens.

Totality ends at 03h 44m UT, as the Moon's easterly limb re-emerges into sunlight. The partial phase ends at 04h 51m, by which time the Moon, seen against the stars of Aries, will be lowering in the western sky as dawn approaches.

The lunar eclipse of 2004 May 4, photographed by Neil Bone just after the end of totality. *N. M. Bone.*

The planets

Mercury is at superior conjunction on the far side of the Sun on October 5, then moves into the evening sky, reaching greatest elongation 22° east of the Sun on November 21. Throughout this apparition, Mercury is at a southerly declination, and the planet will be invisible from the latitudes of the British Isles.

Venus continues its fine showing as a magnitude –4 'morning star', rising about three hours ahead of the Sun in early October, and still more than two hours before sunrise at November's end. Venus' elongation west from the Sun decreases from about 40 to 30° in this interval. Telescopically, the planet shows a gradually broadening gibbous phase, but the disk itself has a relatively small angular diameter of under 15 arcseconds.

Mars has re-emerged from solar conjunction into the pre-dawn sky, where it will remain as a rather dim red 'spark' for the rest of 2004, only a little brighter than second magnitude and too far away to reveal much in the way of detail in most amateur telescopes.

Also returning to view is Jupiter, shining at mag –2 among the stars of Virgo and rising three hours before the Sun by early November. The large (30 arcsecond) apparent disk of the planet shows considerable cloud detail in even quite modest telescopes, and early-morning views in good seeing conditions during this period should reveal Jupiter's dark belts, light zones and spot features.

Jupiter and Venus are close together in the pre-dawn sky in early November, having a close conjunction 33 arcminutes (roughly a Moon-width) apart on the morning of November 5 – an attractive pairing for wide-field photography.

The only planet well-placed for evening observation in this interval is Saturn, in Gemini to the south of Castor and Pollux. Rising around 8pm by mid-November, the ringed planet is well up in the southeast by midnight. The ring system remains open in its presentation towards us, and can be seen well in telescopes of 60mm or greater aperture with a magnification of at least ×40. Larger telescopes, in the 200mm aperture range upwards, may reveal some cloud details on Saturn itself, though these are rather less pronounced than those of Jupiter.

Saturn's large satellite Titan is, at mag +8, a fairly easy target for small telescopes and can be seen about four ring-spans due west of the planet around October 16, and November 1 and 17, being due east about 8 days later.

Minor planets

(4) Vesta remains a fairly easy binocular target, looping against the stars of eastern Aquarius during October and November. Brightest of the asteroids at about 6th magnitude, Vesta can be identified with the help of the detailed chart (showing faint background stars) at **http://www.britastro.org/arps/04-0409.jpg**

Meteors

Absence of moonlight in the early morning hours favours observation of the Orionids

around their maximum between October 20–22. Emanating from a radiant to the north-east of Betelgeuse, the shower is active from about October 17 until the month's end, producing swift meteors, the brightest of which frequently leave persistent ionisation trains. Late night watches are required as the radiant doesn't rise until after 22h local time.

Late-night Orionid-watchers should also note a steady trickle of Taurid activity from radiants west of the Pleiades and Hyades. Typically, observed rates are about 5 meteors/hr, and unlike Orionids, Taurid meteors are notably slow-moving. Produced by debris from Comet 2P/Encke, the Taurid stream is ancient and rather spread out, with a long activity span from mid-October through to the end of November. Rates are at their highest in the first week of November, at which time the Moon will be out of the way in early evening.

Active between November 15–20, the Leonids, like the Orionids, demand late-night observing sessions. The shower radiant, in Leo's 'Sickle', rises around 23h local time, and isn't really well placed until the early hours. Peak in most years occurs around November 17–18, and in 2004 is favoured by dark moonless skies. It will be of particular interest to see how the shower performs this year, some way 'downstream' from the storm returns of 1999–2002. The background Leonid activity level may still be higher than in, say, the 1980s, and watches could be enlivened by a reasonable proportion of bright events with lingering persistent trains.

Further details of Leonid and Orionid prospects for 2004 can be found on page 240.

Photo of M31 from the Deep Sky Section archives. Taken in 1982 with a 25cm telescope by Geoffrey Johnstone, it shows many globular clusters surrounding this neighbouring galaxy to our own.

Variable stars

Autumn's longer hours of darkness offer improved opportunities to follow the famous eclipsing binary Algol (Beta Persei) as it drops to minimum magnitude +3.4 from its usual peak +2.1 at intervals of 2.83 days. Favourably-timed eclipses occur on October 12–13 and 15, and on November 4, 24–25 and 27. Algol takes about five hours to fade to minimum, with a similar recovery time – so a determined observer could just about cover the whole cycle, given clear skies, for the eclipse centred on 01h UT on November 24–25.

Binocular observers seeking a challenge may like to try following the prototype long-period variable Mira (Omicron Ceti) all the way down to its 9th-magnitude minimum towards the end of the year. Found just west of the triangle of Alpha, Gamma and Delta Ceti marking the head of the Sea Monster (Cetus), Mira should be below 7th magnitude during this interval, and would-be observers will need a detailed chart: one is available at http://www.britastro.org/vss/charts/_03902b.gif

Highlighted as potentially entering an interesting, active phase over a year ago, Rho Cassiopeiae (just west of the familiar 'W') has remained fairly constant of late, but is a 5th-magnitude variable star which bears continued monitoring and is well placed on autumn evenings. Rho Cas is a unstable yellow supergiant, and a good candidate for a supernova explosion a few tens of thousands of years hence.

Also long-touted as being on the brink of some interesting activity is the central star of the 'W', Gamma Cassiopeiae. This rapidly-spinning young B-class star is prone to 'shell' episodes, during which its outer layers are shed with attendant brightening, as last occurred in the 1930s. This is a naked eye variable star, whose magnitude can be estimated by comparison with, say, Alpha Andromedae (mag +2.1) and Gamma Pegasi (mag +2.8) at intervals of a few days.

Deep sky

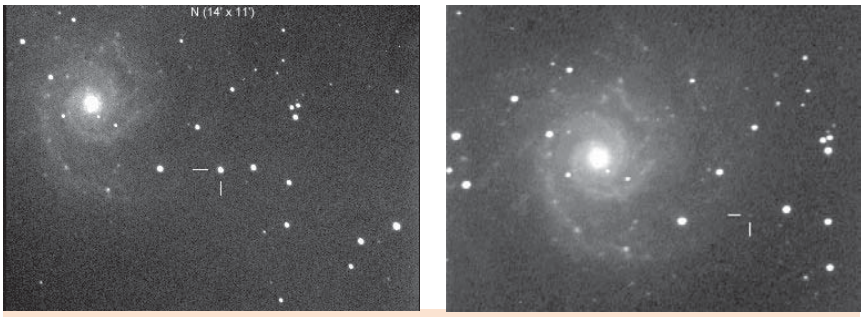
On late autumn evenings, the southern sky aspect from the UK is rather less star-filled than that of the summer recently gone or winter soon to come. Relatively dim constellations with few bright stars occupy the space below (south of) the Square of Pegasus which rides high on the meridian. This region, sometimes called 'The Water', contains aquatic-associated constellations: Capricornus, Aquarius, Pisces, Piscis Austrinus and Cetus. This part of the sky provides a view away from the Milky Way plane and out into intergalactic space. Autumn evenings are good for galaxy-hunting, though for most objects the pursuit will demand the most transparent of nights – bonfire smoke or seasonal mist will render some targets inaccessible.

The easiest autumn galaxy is, of course, M31 (NGC 224) in Andromeda, visible to the naked eye as a third-magnitude haze. Steadily-held binoculars or a small telescope

will reveal the Andromeda Galaxy's 8th-magnitude dwarf elliptical companions M32 (NGC 221) and M110 (NGC 205). In the adjacent constellation of Triangulum, 4° west of Alpha Tri at the sharp tip, M33 (NGC 598) is a good binocular object at mag +5.7. A face-on spiral galaxy, M33 is large (over a degree – two Moon-widths – in diameter) and has low contrast with the background sky. On some nights, it is more readily visible in binoculars than with a telescope. Both M31 and M33 are members of the Local Group to which our Milky Way belongs, lying about 2 million light years away.

The autumn sky contains other, more remote – and consequently fainter – galaxies which can prove a lot more testing. Among these is M74 (NGC 628), a mag +9.4 face-on spiral found 30 arcminutes northeast of Eta Piscium (a rather isolated mag +3.6 star east of the main bright stars of Aries). M74 has low contrast spiral arms and a small, concentrated nucleus. The galaxy is notable as the site of the recent 12th-magnitude supernova SN 2002ap, believed to be a 'hypernova' event resulting from an explosion in an enormously-massive binary star system. M74 lies 35 million light years away.

Another very testing autumn galaxy for telescopes in the 80 to 100mm aperture bracket is M77 (NGC 1068) in Cetus. Located 42 arcminutes ESE of mag +4.1 Delta Ceti (westernmost of the trio of stars marking Cetus' head), M77 is another face-on spiral. This mag +8.9 galaxy has a reasonably large core region and is 60 million light years away.



The bright supernova SN 2002ap in M74, imaged by Martin Mobberley. *Left:* 2002 Feb 14, soon after discovery; *right:* remarkably, still visible on 2002 Nov 26. *M. P. Mobberley*.

The South Galactic Pole lies in the rather obscure constellation Sculptor, low over the southern horizon from the UK on an autumn evening. Here, in 1783, Caroline Herschel discovered the comparatively bright (mag +7.1) NGC 253, sometimes known as the Silver Coin galaxy. A multi-armed spiral, this is presented quite close to edge-on, giving it a relatively high surface brightness. Under good conditions, it should be visible in binoculars and small telescopes, about 7.5° south of the second-magnitude star Diphda (Beta Ceti, itself on a line downwards to the horizon from the eastern side of the Square of Pegasus). This places NGC 253 rather low in our skies – even in southern England it culminates only about 15° up: were it a little farther north, it would surely be better known. NGC 253 is the brightest and largest member of a group of galaxies some 10 million light years away, which may be the closest to our Local Group.

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