Sky notes

2005 December & 2006 January

by Neil Bone

Sun, Earth and Moon

The northern hemisphere winter solstice occurs on December 21 when, at 18h 35m Universal Time (UT, equivalent to GMT), the Sun reaches its most southerly position for the year. Around this date, the days are at their shortest, and during the few hours when it is above the horizon the Sun cuts a low arc across the southern sky. The Solstice is taken calendrically to mark the start of winter, but astronomers are probably more inclined to follow meteorological convention, wherein the season starts at the beginning of December.

The short hours of daylight limit opportunities for solar observing – indeed many of us may only see the Sun at weekends as the season of dark mornings and dark evenings for the daily commute is here. Those who can continue daily monitoring of the solar disk (projection remains the recommended safe method) will find a relative dearth of sunspot activity. Solar minimum is expected during 2006, and after a remarkably active 'tail' with several large, complex active regions up to 2005 September, sunspot cycle 23 is now winding down. Spotless days have become more common of late.

Experienced observers are on alert for the appearance of the first spots of cycle 24, which should be starting to break out at higher solar latitudes, while the last few of the current cycle are close to the Sun's equator.

The Moon is New on December 1 and 31, and on January 29: dark skies will usher in 2006! Full Moon, high against the stars of Gemini in December and Cancer in January will swamp all but the brighter stars on December 15 and January 14: faint-object observation will be restricted for several days to either side of these dates.

Earth reaches perihelion, the closest point to the Sun in its elliptical orbit, on January 4.

The planets

Early risers have a good opportunity to view Mercury during the opening half of December. The planet reaches its greatest elongation 21° west of the Sun on December 12, and for several mornings to either side of this date will be rising almost two hours ahead of the Sun. At magnitude –0.5, Mercury will be reasonably prominent as a 'spark' low in the southeastern sky. By late December, Mercury becomes lost in the near-solar glare, and the planet eventually reaches superior conjunction on the Sun's far side on January 26.

Having been rather poorly placed for much of 2005, Venus finally comes to real prominence as an 'evening star' in early December. Setting 3h 30m after the Sun, Venus shines as a brilliant mag. –4.5 beacon in the early-darkening west/southwest sky. Greatest elongation was reached early in November, but Venus remains quite far east from the Sun until mid-December. Around Christmas, though, the planet begins to close back in towards the Sun by a degree per day, and the apparition comes to an abrupt end in early January. During the latter stages of the visibility period, Venus will show a large but slender crescent phase – similar to that of the young Moon a few days after New. The phase should be discernable even in 10×50 binoculars.

Venus reaches inferior conjunction between the Earth and Sun on January 13, emerging rapidly thereafter into the morning sky. By late January, Venus will be rising around 06h local time, almost two hours ahead of the Sun. At this time its crescent phase (now resembling the Moon just before New) will again be easily seen in binoculars and small telescopes.

Following early November's opposition, Mars rapidly becomes less favourable for observation during December. Earth's orbital motion carries us quickly away from the Red Planet, with the result that the apparent disk diameter diminishes from 17 arcseconds at the beginning of December to 12 arcseconds at the close of 2005. Those with larger telescopes – 200 mm aperture upwards – should still be able to pick out some surface detail, but Mars will be less rewarding for observers with more modest equipment. In addition to showing a reduced apparent disk, Mars fades from mag. –1.5 in early December to mag. 0 in late January, becoming much less conspicuous as it moves eastwards against the star background from Aries into Taurus, west (right) of the Pleiades.

Jupiter is an early morning object in December, relatively poorly placed low down against the stars of Libra in the southeastern sky during the last couple of hours of the night. Even in late January, the mag. –2 giant planet won't be up until about 02h UT, and most observers will wait until spring for more convenient viewing opportunities.

Saturn, in Cancer close to the Praesepe open cluster M44, – an attractive pairing for binocular viewing – is well-placed, reaching opposition on January 27. With the planet a little further south in the sky, the presentation of the rings is noticeably less open than it was a year ago: Saturn's north polar region is no longer hidden behind the rings. The rings are still sufficiently well open that they can be easily resolved in small amateur telescopes in the 60–80mm aperture bracket. Larger instruments will reveal some of the subtly-shaded cloud features on the globe of the planet itself.

Magnitude +8 Titan, Saturn's largest satellite, can be found due west of the planet at a distance of about three ring-spans on December 5 and 21, and January 6 and 22; Titan will be due east of Saturn eight days after these dates.

Minor planets

Two of the larger, brighter asteroids come to opposition in this interval, and will be in range for binocular observation. (3) Juno, a shade brighter than mag. +8, can be found a little west of Orion's Belt, slowly moving retrograde (westwards) against the star background from night to night. Juno is at opposition on December 12.

(4) Vesta is an easier binocular target, at mag. +6, reaching opposition against the stars of western Gemini on January 5.

Meteors

The Geminids, active from December 7–15, are poorly-placed in 2005, with the Moon only a couple of days from Full at the shower's normally-prolific Dec 13–14 maximum.

Darker skies prevail for the Ursids, a poorly-observed shower which normally produces fairly modest activity (perhaps 5 meteors/hr) between December 17 and 25. Maximum falls on Dec 22–23, and evening observations at this time will be unaffected by moonlight. The shower radiant, near the bowl of Ursa Minor's 'dipper', is circumpolar. The Ursids have produced outbursts of unexpectedly high activity in the past, and this much-neglected shower really merits more careful attention.

The Quadrantids open 2006 with a reasonably favourable return. Active between January 1–6, the shower has a very narrow maximum, with the highest rates in a six-hour interval on Jan 3–4. Peak in 2006 is expected close to Jan 3d 17h UT, as night falls in western Europe. At this time, the

radiant (in northern Boötes) is sinking in the northwestern sky, and although circumpolar, it will remain low for observers at the latitudes of the British Isles until the early hours. Watches on the evening of Jan 3–4 should still be productive, and later on the numbers of bright Quadrantids, particularly, could make for rewarding viewing.

Following the Quadrantids, meteor activity in January–February slumps to its lowest for the year, with only very minor shower and low sporadic rates in evidence.

Variable stars

Algol (Beta Persei) can be caught at minimum early on the evening of December 2, and on the nights of Dec 19–20 and 22–23. Further opportunities come on Jan 8–9 and 11–12, and the evening of January 14. This famous eclipsing binary system fades from maximum magnitude +2.1 (where it spends much of its time) to mag. +3.4 at minimum, the decline and recovery each taking five hours; long, dark midwinter nights offer the determined observer a chance to follow entire eclipse cycles. Brightness estimates can be made using Alpha Andromedae (mag. +2.1) and Kappa Persei (mag. +3.8) as comparisons, at intervals of 15–20 minutes. Plotted as a light curve, the estimates, requiring no more equipment than the naked eye, can be used to establish the time of mid-eclipse with reasonable accuracy.

Among winter's other prominent variable stars is Rho Persei, a close neighbour in the constellation to Algol. Rho is a pulsating orange-red giant star, showing several overlapping cycles of variation over an extreme range from mag. +3.3 to 4.0: in any one observing season, the maximum range is more usually a few tenths of a magnitude. Rho Per varies quite slowly, and naked-eye estimates at weekly intervals suffice to keep the star covered. Good comparisons include Eta Aurigae (mag. +3.2), 41 Arietis (mag. +3.6) and Iota Persei (mag. +4.1).

Deep sky

The northern winter Milky Way is rather wan in comparison with its bright summer counterpart. On a good, clear moonless December/January night, however, the faint band of our galaxy can be seen extending from Cassiopeia and Perseus high overhead, into Auriga, clipping the feet of Gemini, and on to Orion's east through the star-sparse constellation Monoceros, before reaching the southern horizon via Canis Major and Puppis. Along this span, formed by a spiral arm lying beyond ours in the direction of the Galaxy's rim, are found a number of excellent open star clusters. On the best nights, it can be a rewarding experience to lie back in a garden recliner and sweep from the zenith downwards along the Milky Way using a pair of 7×50 or 10×50 binoculars. Tucked between Cassiopeia's 'W' and the northern end of Perseus, the 'Double Cluster' NGC 869 and 884 is the first of many fine objects which will be swept up; on a good night, this pairing is visible to the naked eye as an elongated hazy patch. Binoculars will show a coarse scattering of stars over an are three Moon-widths across, while a small telescope reveals maybe a couple of hundred stars in each cluster, and will bring out the colour of the numerous evolved red giants intermingled here.

Continuing the sweep southeastwards in the direction of Auriga brings the fine trio of M38 (NGC 1912), M36 (NGC 1960) and M37 (NGC 2099) into view: these are 'knots' in the Milky Way as seen in binoculars, and in a small telescope each reveals a subtly different character. All three are packed with faint stars.

Further on, at the northwest (upper right) corner of Gemini, M35 (NGC 2168) is a real winter showpiece. Under the very best conditions, this is visible with the naked eye as a fifth-magnitude fuzzy spot. In binoculars, M35 becomes a circular haze comprising a couple of faint (mag. +8 to +9) stars in a 30 arcminute wide area – about the same apparent size as the Moon. Any small telescope will resolve it better still, while instruments of 150mm aperture upwards will reveal the compact NGC 2158 near M35's southwestern edge. NGC 2158 is a much more remote cluster in the same line of sight, at a distance of 16,000 light years compared with 2800 light years for M35.

South from Gemini into Monoceros, the sparse but bright NGC 2244 – the cluster at the heart of the visually-elusive Rosette Nebula – is always attractive at low magnifications. Also in Monoceros, M50 (NGC 2323) is a coarse scattering of fainter stars in an area about 15 arcminutes across, located one-third of the way from Sirius on the line connecting the Dog Star and Procyon.

Many, many more less conspicuous clusters populate the winter Milky Way, and despite its comparative faintness, this really is a rich hunting ground for deep sky observers.

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