Sky notes

2003 December & 2004 January

by Neil Bone

Sun, Moon and Earth

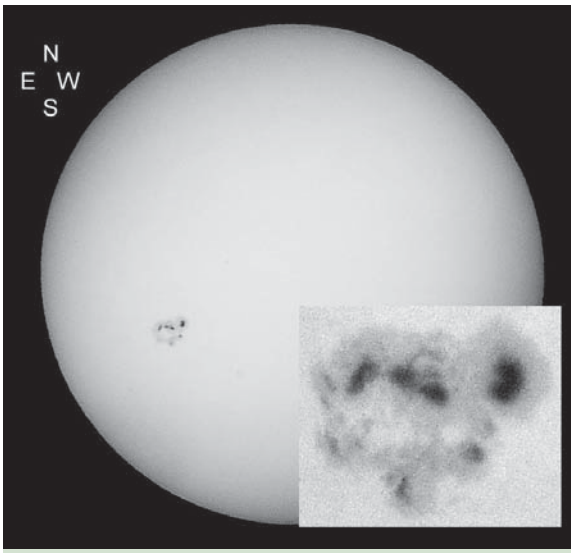
The Sun reaches its farthest southerly declination in its apparent path around the star background – the ecliptic – at 07h 04m Universal Time (UT, equivalent to GMT) on December 22. This is the moment of the northern hemisphere winter solstice. The solstice is taken calendrically to mark the start of winter but amateur astronomers may prefer to work more to meteorological convention, wherein the season is taken to run from the beginning of December until February's end; certainly, the night-time sky is now dominated by the constellations most traditionally associated with winter.

Lying low against the stars of Sagittarius, the Sun itself is a difficult observational target during December and January: many of us will see it (if at all) only at the weekend! Even for those able to observe through the week, opportunities are fairly limited, with the Sun only up for a relatively short time, and often hidden behind trees, buildings and other local obstructions which interrupt its arc low across the southern sky.

Sunspot cycle 23 is well on the wane now, and observers projecting the solar disk may be starting to find that some days are spot-free. There are, however, still occasional large spot groups like active region 484 which appeared in late October, to leaven the steady decline. Activity will probably reach minimum sometime between 2005 and 2007.

The Moon is New on December 23 and January 21; immediately after Christmas, owners of new telescopes will have the chance to put their equipment through its paces under dark sky conditions, while the waxing crescent – replete with crater detail on the day-night line of the terminator – will make an excellent evening target. Full Moon will swamp the fainter stars on December 8 and January 7, and for several nights to either side.

Earth reaches perihelion on January 4, then being closest in its elliptical orbit to the Sun. The difference in distance between perihelion and aphelion (the most distant point, reached in early July) is relatively small, only about 3%. In terms of governing climate, the seasonal effects of Earth's 23.5° axial tilt are far more significant.



The massive naked-eye sunspot group AR484, imaged at 10:40 hrs UT on 2003 October 21 by Peter Paice.

The planets

Mercury is technically an evening object in early December, reaching greatest elongation 21° east of the Sun on Dec 9. It southerly declination, however, renders Mercury very low in the southeastern sky after sunset, and the planet is unlikely to be seen from the British Isles. Mercury reaches inferior conjunction, between Earth and the Sun, on December 27, then moves into the early morning sky where it makes another unfavourable elongation, 24° west of the Sun on January 17.

Becoming ever more conspicuous, by contrast, is Venus, beginning the best part of a remarkably favourable showing as 'Evening Star' in the western sky after sunset. Venus is already 30° east of the Sun by mid-December, and at magnitude –4 will be hard to miss by Christmas time, when it will be setting about two hours after the Sun. By late January, Venus will have pulled out to almost 40° from the Sun, becoming yet more prominent. Telescopically, the view is still quite disappointing: Venus will reveal little more than a small (15 arcsecond diameter) disk with a slowly diminishing gibbous phase similar to that of the Moon between first quarter and Full.

Mars, among the stars of Pisces, fades below mag. 0 during December, and is now an evening object setting around midnight. The apparent disk diameter falls below 10 arcseconds in this interval and only those with access to telescopes in the 200mm and upwards aperture range can probably now entertain much hope of resolving details on the Red Planet's surface as this most excellent apparition winds down.

During December and January, the best planetary views will be provided by the gas giants Jupiter and Saturn. Jupiter is now returning to prominence as a late evening/early morning object among the stars of Leo. By the end of December, mag. –2 Jupiter is clearing the eastern horizon by 23h UT. Even quite modest telescopes – in the 70–80mm aperture bracket, say – will reveal a fair amount of detail on the giant planet's slightly-flattened 40 arcsecond disk. Our view of Jupiter is of alternating dark belts and light zones, with some bright spots, 'festoons' and knots of material also visible, together with the famous Great Red Spot (GRS) in the planet's southern hemisphere. To some eyes, those of this writer included, the GRS usually appears more a dull grey, but reports from last apparition suggest that both the colour and prominence of the spot have increased lately.

Saturn is high on the ecliptic among the stars of Gemini, reaching opposition (180° from the Sun in Earth's sky) on Hogmanay. At magnitude –0.4, Saturn is marginally brighter than the yellow star Capella in Auriga, (in the zenith late on mid-winter evenings), and although of similar colour seems a little duller by virtue of its extended – but sub-naked eye resolution – disk. The rings are just starting to become more closed in their presentation, and remain a magnificent sight in any telescope with an aperture of 60mm or more. Cloud details on the planet itself are a good deal subtler

than those of Jupiter, and may require apertures of 100mm and upwards to be revealed.

Minor planets

The first of the asteroids to be discovered, (1) Ceres, reaches a favourable opposition during January, and will be fairly easily visible in binoculars as a 7th-magnitude point of light, slowly looping retrograde (westwards) against the star background of near Pollux in Gemini during this interval.

Meteors

Bright moonlight severely hampers observations of the Geminids, active between December 7 to 15. Peak activity is expected during daylight hours on December 14, and watches early on Saturday evening Dec 14–15, in the hours before moonrise (ca. 21h in the UK) might be productive: the shower has shown broad maxima in recent years. Bright events may be quite numerous.

Active just before Christmas, from December 17 to 25 with a maximum on Dec 22–23, the Ursids must surely be the year's most neglected meteor shower! This is a pity, as the shower – with a radiant near Beta UMi, one of the 'Guardians of the Pole' – is the equal of the Lyrids in April, which receive a lot more observer interest. Additionally, the Ursids are prone to occasional outbursts of higher activity. Usually, rates of perhaps half a dozen Ursids per hour can be expected by observers prepared to brave the midwinter cold. The 2003 return is blessed with moonless skies. Ursid meteors are swift, and mostly in the mag. +2 to +3 range. The stream parent is Comet 8P/Tuttle.

The Moon again interferes seriously with the Quadrantids at their peak on January 3–4. The shower's usually-narrow maximum is expected around 04h UT, a couple of hours before daybreak on Sunday morning January 4. On this day, the waxing gibbous Moon will set around 05h from the British Isles, giving a brief window of darker skies during which good activity – perhaps a meteor every minute – may be caught emanating from the radiant in northern Böotes, high in the northeastern sky.

Variable stars

Algol undergoes favourably-timed eclipses, during which it will drop from its maximum mag +2.1 to mag +3.4, on the nights of December 13–14, 16 and 19, and January 5–6, 8, 28 and 31.

High in the northeast, Rho Cassiopeiae – just west of the constellation's 'W' – still bears nightly coverage, with professional workers suggesting that unusual activity may be imminent from this yellow 'hypergiant' star. As of October, it remained close to fifth magnitude, an easy binocular object.

Among winter's main luminaries, Betelgeuse (Alpha Orionis) is a noted red giant star, and one which shows slow but noticeable variations around a mean magnitude of about +0.3. Estimates can be made with the naked eye at intervals of a week or so, using as comparisons Rigel (mag. +0.1), Procyon (+0.3) and Aldebaran (+0.9).

Deep sky

For most observers, the signature constellation of winter is surely Orion. The distinctive outline is hard to mistake when high in the southern midwinter midnight sky. Red Betelgeuse at the Hunter's eastern shoulder, and dazzling blue-white zero magnitude Rigel at his western knee are among the brightest stars in the winter firmament, and the slanting line of second-magnitude stars marking Orion's waist or belt is as familiar to many as the Plough. About five degrees south of (below) Orion's belt is the famous Orion Nebula (M42), always a bright and popular 'first light' target for new telescopes and binoculars.

The winter Milky Way, running from Perseus through Auriga and Gemini, down into Monoceros east of Orion and south to Canis Major, is rather fainter than its summer counterpart. Here, however, are numerous open star clusters for binoculars and small telescopes. In the low southern sky, some four degrees under Sirius, M41 (NGC 2287) is a well-scattered collection of between 30 and 50 mag +7 to +9 stars covering an area about 40 arcminutes across. Binoculars will resolve it, while a 60–80mm aperture telescope at ×30 magnification will neatly fit M41 into the field of view and reveal the slightly off-centre red star for which the cluster is noted.

Lower still, eight degrees to the SSE of Sirius, and something of a challenge from more northerly climes, is the open cluster NGC 2362, around the fourth-magnitude star Tau CMa. Tau may be the brightest member of this 8 arcminute wide cluster of about 40 young stars at an estimated distance of 4600 light years.

Globular clusters are rare in the winter sky; most congregate around the hub of our Galaxy in the direction of Sagittarius, best presented in the summer months. There is one good example, however, in December–January skies, low down in the relatively obscure constellation of Lepus below Orion's feet. M79 (NGC 1904) is a tricky 8th magnitude object, rising little more than 15° above the horizon from southern English latitudes and therefore demanding the clearest and darkest sky conditions. M79 lies 4.5° south from Alpha and Beta Lep on the line through the two stars, and has a compressed central region. Under the very best of conditions on a frosty, moonless December or January midnight, this is a challenging object for 10×50 binoculars.

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