Notes and News

Campaign for Dark Skies

The Christmas and New Year Orion star count

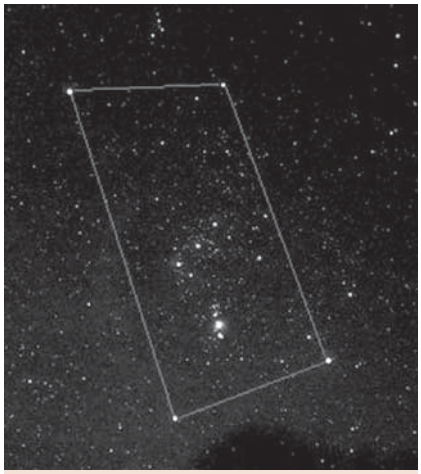


Figure 1. Wide-field view of the main region of the constellation of Orion. Contributors to the project counted stars visible within the rectangular border shown.

In December last year, the BAA Campaign for Dark Skies (CfDS), in conjunction with the Campaign to Protect Rural England (CPRE), launched the first-ever Orion star count: a survey to evaluate light pollution in the United Kingdom. With the assistance of Callum Potter, our website manager, and other officers of the CfDS, a webpage (**www.britastro.org/starcount**) dedicated to the project was established. People in the UK were asked to estimate the number of stars they could see with the naked eye within the constellation of Orion bordered by a rectangle of four bright stars (Orion's 'shoulders' and 'feet': stars α, γ, β and κ). The count included the three stars of Orion's Belt, but excluded the four 'corner' stars themselves (see Figure 1). Results were reported to the BAA either by post or by filling in an online form. Observations were made in the absence of moonlight when the sky was naturally dark during late December and January.

The actual number of stars visible is very dependent on the brightness of the sky background and hence light pollution. The more stars visible, the fainter the limiting visual magnitude (LM). For the Orion star count, corresponding LM values were as follows:

Limiting magnitude	*No. of stars seen*
<2.0	0–1
2.0–2.9	2–3
3.0–3.9	4–6
4.0–4.4	7–9
4.5–4.9	10–20
5.0–5.4	21–29
5.5–5.9	30–40
6.0–6.4	41–65
6.5+	>65

In all, we received 1848 reports. Of these, 1696 records were successfully matched to postcodes and were able to be placed on the UK map. Reports from England and Wales totalled 1653 records, the locations of which are shown in Figure 2. With such an excellent response from our members and other contributors, we were able to obtain good statistics on light pollution conditions within England and Wales. Here, an average number of 12.1 stars were reported corresponding to a mean limiting magnitude of 4.6. Since these figures are based on estimates from a very large number of people, the standard error on the value of 12.1 stars is remarkably small at ±0.3! Having achieved this result this year, it is hoped that we shall be able to monitor quite small changes in light pollution by repeating the Orion star count from time to time in future years.

Being able to link observers' postcodes to geographical locations, it was possible to examine the spatial variation in light pollution throughout much of England and Wales. Of the

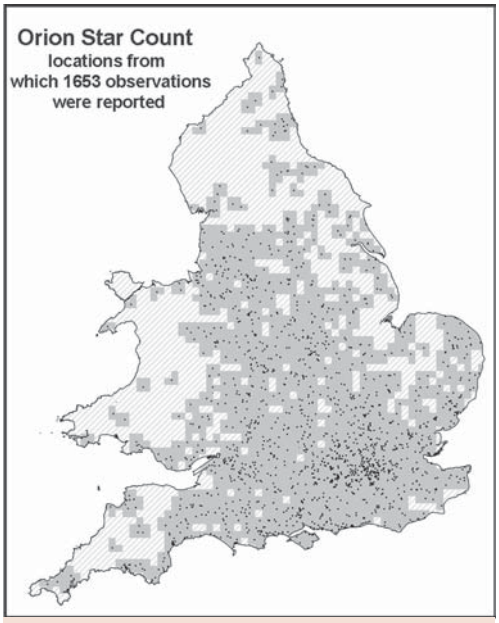


Figure 2. Spatial distribution of 1653 observations (black dots) and interpolated areas (grey). Regions having insufficient observations or no data are shown hatched. *Borders are Crown copyright material, reproduced by the permission of the Controller of HMSO, Licence C02W0003601.*

From the President

In these days of fast internet access, the Web and miraculous search engines, all of which can generate seemingly endless amounts of data and information, I particularly look forward as a refreshing change to the many meetings that the Association holds throughout the year. We are very much an association of like-minded people who seek to widen our knowledge of astronomy but also to enhance our experience and understanding. Part of this experience is meeting up socially at various venues whether at an Ordinary Meeting in London, an Observers' Workshop, a Back-to-Basics meeting, the Exhibition Meeting, an Out-of-London meeting or one or other of the various Section Meetings held around the country.

I suggest that these meetings are very much the lifeblood of the Association, where both members and others can assemble, for example to hear the latest news about some astronomical or space event, listen to a historical account of some personage or observing feat, chat informally about a recent observing project and renew old acquaintanceships. Many of the keynote speakers are astronomers of world renown and hearing what they have to tell us face to face is a quite different experience from what is available via the likes of the Web or the internet. I know that a fairly small fraction of our more than 2900 members attend meetings, so if you are one of those folk who rarely if ever manages to go along to one of these events, I would strongly urge you to do so as I am sure you will not be disappointed.

At many of our meetings we also have various trade stands where you can browse the items for sale or talk to manufacturers and suppliers of astronomical equipment, book suppliers and others. We also usually have a BAA stand thanks to Ann Davies and her helpers, where you can obtain our literature and other sales items.

Our last meeting (as I write this note) was the annual Winchester Weekend held on March 30 to April 1. This event has been held without fail now for more than 40 years and is a 'must' for many BAA members. If you fancy a weekend break then do seriously consider signing up for next year's extravaganza. I would like to take

ten regional areas surveyed, the worst light pollution was found for the northwest (mean of 8.6±0.9 stars visible), and London (8.9±0.8 stars). On average, light pollution is lowest in the southwest (16.0±0.9 stars) and in Wales (16.0±2.3 stars). With so many reports available, it was possible to map the variation locally within regions, especially the more highly populated ones. Interestingly, if the observations had been equally spaced throughout England and Wales they would have been 9.6km apart. In practice many reports were much more closely spaced than this since large areas, for example within Wales, had insufficient or no data.

Spatial interpolation of the data was carried out using the geostatistical method of *kriging*, which assumes a spatially correlated bias is present in the data over relatively short distances. On this basis an interpolated surface was generated, where at least 5 points were available within a radius of 8km, to produce the map depicted in Figure 3(A). It is intended that a more detailed analysis of the Orion star count data will be submitted in the form of a paper for publication in the *Journal* in due course.

That the present star count method is a sensitive measure of the degree of light pollution across the country is very evident when comparing our map shown in Figure 3(A) with an image (Figure 3(B)) showing the distribution of artificial light at night for England and Wales obtained by the US Defense Meteorological Satellite Program (DMSP). The similarities between the two representations are remarkable.

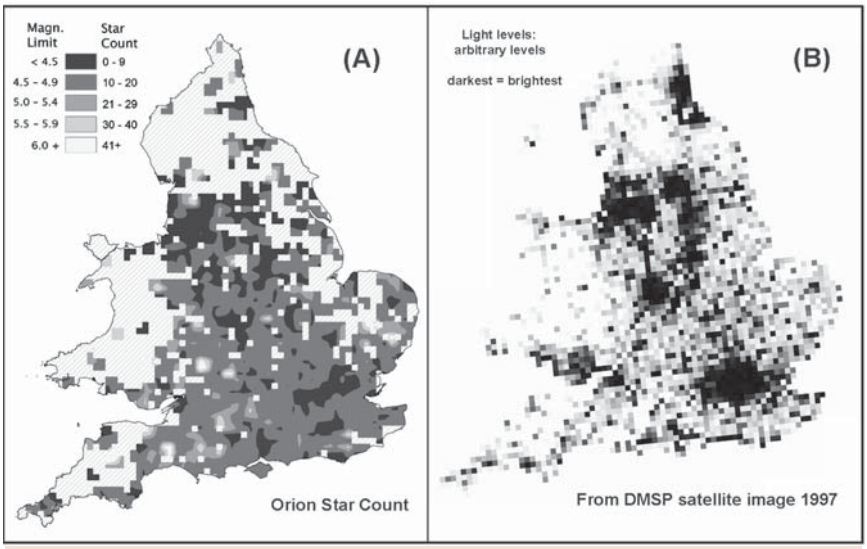


Figure 3. **(A)** Map showing interpolated star counts for England and Wales. Areas having insufficient or no data available are shown hatched. Borders as for Figure 2. **(B)** Distribution of artificial light at night for England and Wales obtained by the US Defense Meteorological Satellite Program (DMSP). Darker shading corresponds to brighter light levels. *Courtesy of the International Dark-Sky Association.*

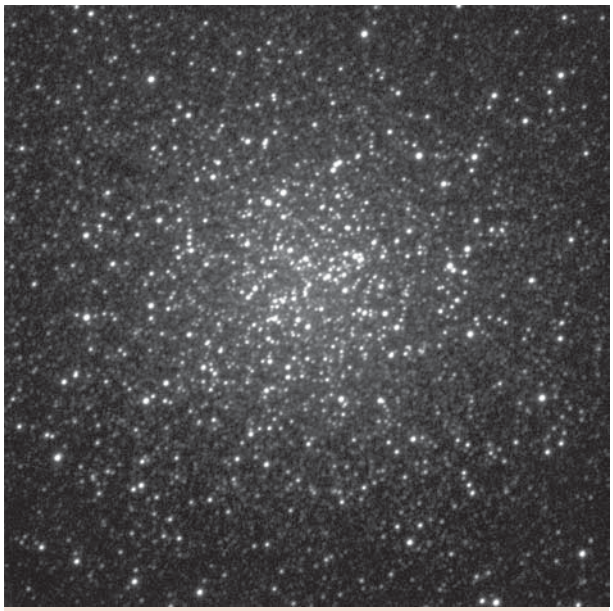
We are very grateful to all those who contributed reports to the 2006/7 Christmas and New Year campaign – many thanks to you all. Do look out for repeats of the Orion Star Count project in the future. The more people who take part, the better we shall be able to keep an eye on light pollution trends, both locally within your area and nationally across the country.

Richard Miles & David Lloyd

(David Lloyd is currently researching for a PhD in geographic information at the giCentre, Department of Informatics, City University, London.)

From the President – continued

this opportunity to thank Richard Flux for organising Winchester so efficiently these past 10 years and welcome back Alan Dowdell, who is an old hand having run the weekends previously. We have stayed with the same venue all along and facilities at the college, now the University of Winchester, have continued to improve. The lecture theatre is first-class. This year our keynote speaker for the Alfred Curtis Memorial Lecture on Saturday evening was Dr Simon Mitton, who gave us a fascinating insight into the life of Fred Hoyle. Earlier that day, Dr Paul Roche led an observing session via a live link to the Faulkes Telescope North located on Maui, Hawaii, fielding requests for target objects from the audience. This is the second BAA meeting when we have been able to control the 2.0 metre telescope on the other side of the world (see *Journal* for 2006 June). It seemed to me that everyone's eyes were transfixed as the images were downloaded over the Web and shown on the big screen – see for example the accompanying image of the central region of Messier 13.



The central region of the globular cluster Messier 13, imaged by the 2.0 metre Faulkes Telescope North through a V filter using an exposure time of 5 seconds. The image was obtained at the BAA Winchester Weekend meeting on 2007 March 31 at 13:35 UT under good seeing conditions (FWHM = 1.0 arcsec) and subtends a field of view of 4.6 arcmin square. Note that the overall apparent diameter of M13 seen with a small telescope is about four times the width of this image.

I am also anticipating an excellent day at the Birmingham and Midland Institute where we are holding a joint meeting with the Society for the History of Astronomy on April 21, for which I have to especially thank our Meetings Secretary, Hazel Collett, and SHA secretary, Stuart Williams for all the hard work they have both put in to make the day a reality. By the time you read this, some of you will have attended the meeting and will no doubt vouch for yet another set of excellent talks.

Our speakers are very dedicated folk, who invest a great deal of effort in preparing their talks, and this includes our own Section meetings. I enjoyed attending the latest Deep Sky Section meeting held in Northampton on March 3, when I too had the opportunity to speak, my subject being 'Two-colour imaging of the Deep Sky'.

Observing Section meetings are great opportunities to meet up with other observers or to hear the many

talks given by active observers and others. Other recent Section meetings included the Variable Star Section in Edinburgh on May 5, an Instruments and Imaging meeting in Northampton on May 12 and an Asteroids and Remote Planets meeting in Newbury on June 2. (N.B. you might just have time to make the latter as most UK-based members should receive this *Journal* by the end of May).

If all of the above meetings happen to have passed you by, do not be too concerned as you still have an opportunity to go along to the annual showcase occasion, the Exhibition Meeting, which will take place on Saturday, June 30 at (for the first time) the National Space Centre in Leicester. I do hope you will be able to join me there when I shall also be presenting three of the Association's awards this year. This venue should prove especially interesting in that the general public, including parents and children who happen to be visiting the NSC on the day, will also be invited to look around the exhibition put on by our many Sections. If you are planning to attend then do bring along some examples of your recent observations as every contribution helps to make the day a great success. See you there!

Richard Miles, *President*

Jupiter Section

Jupiter embarks on a 'global upheaval'

Once again, Jupiter graces the cover of the *Journal* (Figure 1) – this time with major changes, which seem to be a long-awaited example of the grand phenomenon called a 'global upheaval'. The last of these occurred in 1990. This has added to the excitement of a flyby of Jupiter by the spacecraft *New Horizons*, en route to the outer solar system. Observers in the southern hemisphere have risen to the occasion by producing increasingly impressive colour webcam images.

Figure 1 (on the cover)

The new face of Jupiter in 2007. (South is up in all images except for those of Io.)

Top left: The Great Red Spot, 2007 April 11, 16:03 UT (Stefan Buda, Australia). In contrast to previous years, the GRS is an isolated orange oval and the SEB following it is entirely quiet. The equatorial region is very dark but dramatically disturbed by the South Equatorial Disturbance, passing the GRS.

Bottom left: The GRS on Feb 27 (*New Horizons*, LEISA). This is a false-colour image made from three infrared wavelengths: red = 1.28μm, green = 1.30μm, blue = 1.36μm. This choice of wavelengths highlights hazes at different altitudes in the atmosphere. The oval GRS looks white because it has thick cloud at all levels probed. Credit for all *New Horizons* images: NASA/Johns Hopkins University Applied Physics Lab/Southwest Research Institute.

Centre: Io on Feb 28 (*New Horizons*: a lo-res colour image from MVIS combined with a hi-res white-light image from LORRI). On the dark side, two volcanic plumes shine blue: at top, the 330km high eruption from Tvashtar, lit by the Sun; at bottom right, the smaller plume from Masubi, lit by Jupiter. Below the Tvashtar plume is the bright red spot of the volcano itself, possibly a lava fountain.

Right: Three images showing exciting new features, by Zac Pujic (Australia): 2007 Feb 23, 19:17 UT; March 29, 17:24 UT (with shadows of Europa and Ganymede); April 5, 16:36 UT. In the top half of each, the orange ring is oval BA, and the dark bridge next to it is South Tropical Disturbance STrD-1. In the lower half, the blue arrow points to the super-fast North Temperate outbreak, seen as a new brilliant white spot on March 29, and spreading right across the disk by April 5.

The New Horizons *flyby*

The prime target of *New Horizons* is Pluto, but the only planet it is visiting (according to the IAU's new definition) is Jupiter. The flyby was planned to give the spacecraft the extra speed it needs, and the team used the opportunity to test all their instruments. *New Horizons* is a much cheaper mission than *Cassini*, and has returned less data from Jupiter – much of it trickling in for several weeks after the flyby. Nevertheless, this was entirely successful, and the data sets were unique and very revealing.

Imaging was performed intermittently from 2007 January 8 to 22 (Figure 2a), so as to track currents over the whole planet. The images were taken with the powerful telescope called LORRI (Long Range Reconnaissance Imager), but being optimised for the dim lighting at Pluto, this takes images in white light, and at close encounter with Jupiter it targeted features near the terminator to reduce the glare. After the initial imaging, priority was given to ultraviolet spectrometry of Jupiter's aurorae and the Io plasma torus. Imaging of selected targets resumed on February 24 using several instruments, especially LEISA which returned infrared im-

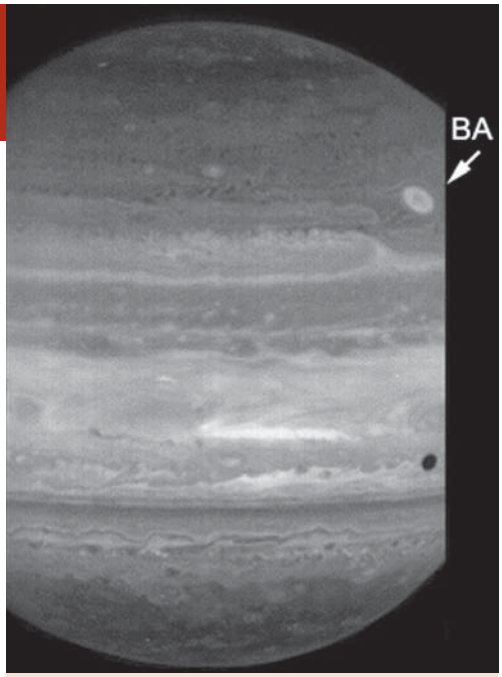


Figure 3. Jupiter in the infrared (1.53μm): one of numerous images from the *New Horizons* LEISA instrument. This wavelength is sensitive to gas absorption and thus to the altitudes of clouds. Note that oval BA is very bright, while STrD-1 is almost a negative of the visible image.

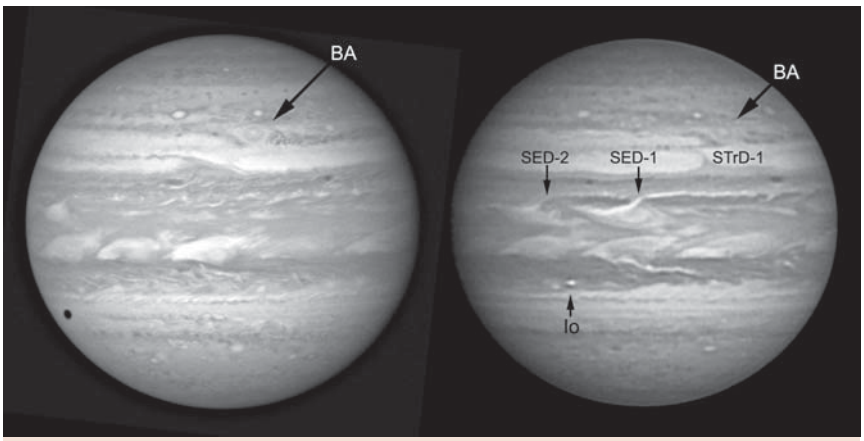


Figure 2. *Left*: Jupiter on 2007 Jan 21, 05:52 UT (*New Horizons*, LORRI). *NASA/Johns Hopkins University Applied Physics Lab/Southwest Research Institute*.
Right: 2007 March 14, 18:47 UT (Anthony Wesley, Australia). The arrow marks red oval BA; STrD-1 is north of it.

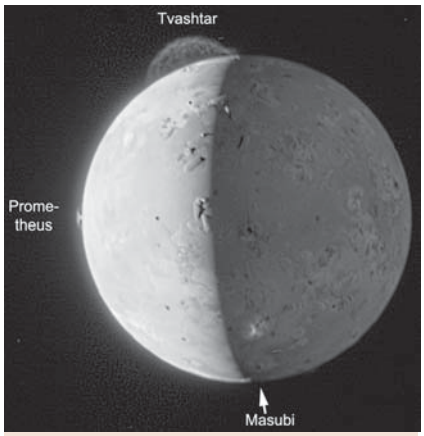


Figure 4. A close-up of Io from *New Horizons* (LORRI). Three volcanic plumes are indicated. This is a combination of two images to bring out detail on the sunlit side (left) as well as the Jupiter-lit side (right).

ages at numerous wavelengths (Figures 1 & 3). Closest approach was on February 28 at a range of 2.3 million km, just outside the orbit of Callisto. This was close enough for LORRI to take full-disk images of the galilean moons and to record the erupting volcanoes on Io (Figure 4). Visible colour images could be taken by the MVIC camera, but not of a surface as bright as Jupiter's. However, MVIC did return a striking view of the volcanic eruptions on Io's dark side (see Figure 1).

In Jupiter's atmosphere, the LORRI team wanted to target two archetypal features: the turbulent cyclonic region of thunderstorms following the Great Red Spot, and the newly-red anticyclonic oval BA. To aim the camera accurately, they asked for help from the BAA Jupiter Section and our colleagues in the *JUPOS* project. This was a challenging request, as the pointing had to be finalised in 2006 September (when the speed of oval BA was varying unpredictably as it had just passed the GRS – see *Journal* cover, 2006 October), and the encounter would happen six months later, just after solar conjunction. So all concerned were very pleased to see oval BA in the centre of the mosaics returned after the flyby (Figure 5). A pair of images taken 9.5 hours apart on Feb 26–27 clearly showed the rapid rotation of the oval.

However, some features seen in the *New Horizons* images were most unexpected. During solar conjunction, the thunderstorms following the GRS – which had been present continuously since 1995 – had disappeared. Meanwhile, alongside oval BA, a prominent dark feature called a South Tropical Disturbance had appeared (Figure 2) – not seen since 1993. These same changes were also noticed, just a few days earlier, in the first good amateur images of the new apparition.

The changes in 2007

To see how the planet has changed over the last year, the images on the cover of this issue can be compared with those on the covers of the *Journals* of 2003 June, 2005 August, and 2006 October. More details are on our website, **http://www.britastro.org/jupiter/**

First, major changes have occurred in the South Tropical region. Everything is quiet, for the first time for many years! Since summer 2006, there have been no dark spots retrograding on the South Equatorial Belt (SEB), and no dark rim round the GRS. And since autumn 2006, there are no white spots in the SEB following the GRS.

The last time that long-running SEB activity stopped like this was in 1988. Then the SEB faded (whitened) in 1989 and a spectacular SEB Revival occurred in 1990. So we may see the SEB fading some time in 2007, with the GRS becoming truly red. We already suspect, in the latest images in 2007 March–April (see cover), that the southern SEB is turning from dark red-brown to a lighter grey, so the fading may be evident by the time you read this article.

As soon as these turbulent thunderstorms and vortices disappeared, two very different circulations, South Tropical Disturbances (STrDs), appeared in the South Tropical Zone. An STrD is a persistent dark structure spanning the STropZ. The first images of 2007 January revealed two STrDs, one of them just north-preceding red oval BA. They were prograding as usual, and images from *New Horizons* and the *Hubble Space Telescope* showed clear evidence of the circulating currents at their p. and f. edges, which are probably the most essential feature but can rarely be observed. The situation resembles 1993 – the last time the SEB faded - when there were two STrDs before the SEB Revival. None have been seen since then.

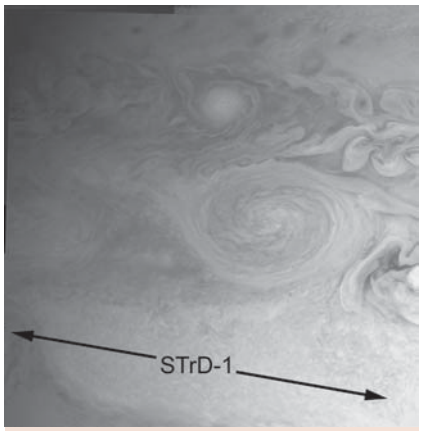


Figure 5. A close-up of oval BA from *New Horizons* (LORRI), Feb 27, 03:12 UT. South is up to match Figure 2. Much of STrD-1 is also in the field of view.

Even more obvious to casual observers are the changes in the Equatorial Zone. The EZ is mostly dark grey and brown. This constitutes a colouration event, but of an unusual type where darkening is more obvious than colouration. This aspect has not seen since 1973–'75, and no strong colouration at all since 1990–'91. During the first half of 2006, the blue-grey projections and festoons from the NEB became much more prominent, and the northern EZ between them lost its long-term pale yellowish tint; meanwhile the centre of the zone became progressively darker brown and grey. This darkening of features all across the EZ has made a very striking picture, including great contrasts between the dark NEBs projections and bright patches in the northern EZ. By 2006 August, there was also a notable yellowish-brown tint in the southern EZ (hitherto very bright white). Thus the colouration event spread southwards (as has been seen in some previous

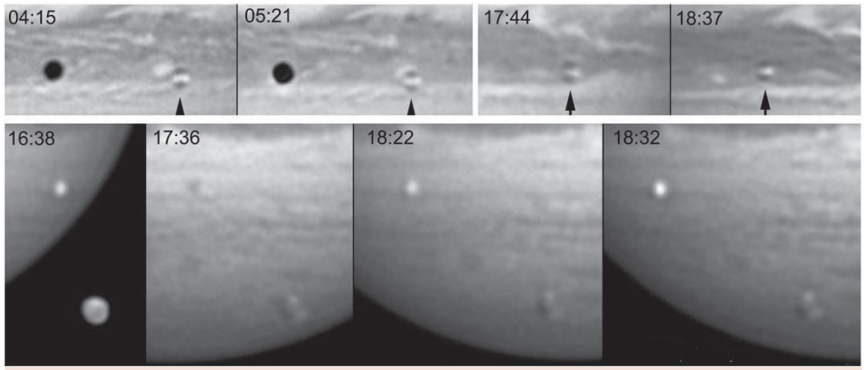


Figure 6. High resolution amateur images resolving the moons in transit over Jupiter. *Top left:* Io and its shadow, 2006 April 14 (Dave Tyler & Damian Peach, Barbados). Io (arrowed) moves over a white oval in the NEB. The dark polar caps and white equatorial band are well resolved.
Top right: Io, 2007 March 14 (Mike Salway & Anthony Wesley, Australia). The left-hand edge is shaded due to Io's phase, 3 months before opposition. Also see Figure 2.
Bottom: Europa (upper) and Ganymede (lower), 2007 March 22 (Mike Salway, Australia). Both show shading of the left-hand edge due to phase, and Ganymede shows an oblique dark band which includes the largest dark area. Galileo Regio. For Salway's movie, also including Io, see **http://www.iceinspace.com.au/downloads/20070323-jupiter_anim.gif**

global upheavals), and the strong orange-brown tint of the SEB(S) in 2007 January may also have been part of it.

As the southern EZ darkened, the South Equatorial Disturbance became spectacular again. This feature was described in our reports for 1999/2000 and 2000/'01, and although it has been very inconspicuous since then, we have tracked it the whole time. Now it has transformed into a pair of great white spots (Figure 1 & 2b), outlined by diffuse bluish and reddish shadings, with large-scale waves preceding them.

Most recently, without warning, a spectacular new disturbance has broken out in the North Temperate region, on the extremely rapid jet stream that marks the NTB south edge. The revival of the belt was expected, but what was not predicted was the hugely energetic outbreak which began on 2007 March 27 (images by Fabio Carvalho) and was discovered on March 29 (Zac Pujic – cover image). It began with two brilliant white spots, erupting far higher than all other spots on the planet (according to methane-band and ultraviolet images by Pujic), and travelling at DL1= −156°/month (168 m/s). Smaller bright and dark spots are forming in its wake, with slightly slower speeds, and this turbulence appears to be breaking up the white cloud cover to restore the dark NTB. Similar superfast outbreaks occurred in 1975, 1980, and 1990, but have not occurred since then. It poses a puzzle: Has the jet stream accelerated so much more in just two years? Or was the faster speed still present all the time below the visible cloud-tops?

A global upheaval

The conjunction of all these events fits beautifully into the definition of a global upheaval, as noted by Wynn Wacker in 1975 and seen again in 1990 (and partially in 1993). Those were the dates of the last three SEB Revivals. (In the meantime, there was a global upheaval in 1978–1980 which had EZ coloration, a STrD, and vigorous activity on some jetstreams including a NTBs outbreak, but no SEB Revival.) Indeed, in the *Journal* of 1990 June you can find a news item with the same title reporting many of the same phenomena as this one.

The most spectacular event of a global upheaval is typically the SEB Revival. So if the SEB does indeed enter such a cycle, some time in the next two years observers should see a grand spectacle, reprising the great events of 1975 or 1990.

The galilean moons resolved

In that news item in 1990, I also reported some then-rare observations resolving features on Io in transit, which suggested that one or both limbs might have darkened since the *Voyager* encounters. Since then, images from *Galileo, Cassini,* and *New Horizons* have shown that large-scale, long-term changes are not occurring on Io's surface. Even the largest volcanic deposits fade away over a few years. But now it is not uncommon for amateur images to resolve the dark polar caps of Io, as well as the largest dark areas on Ganymede: see the *Journal* of 2003 June, and Figure 6. These images also show the phase effect on these moons: as seen in Figure 6, they appear distinctly gibbous due to the gradient of illumination, in spite of the small phase angle. This was undoubtedly the origin of the 'dark crescent Io' observation in 1990.

John H. Rogers, *Director*

Deep Sky Section

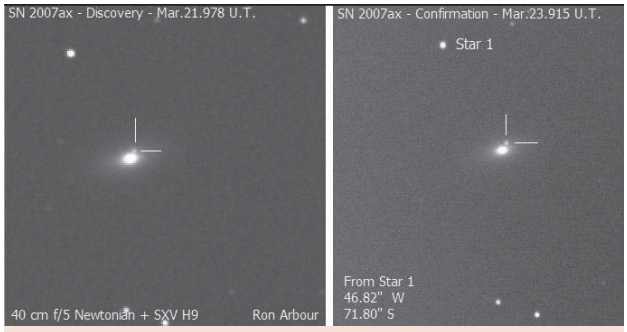
Two supernovae discoveries for Ron Arbour

SN 2007av in NGC 3279. Master and confirmation image. 40cm f/5 Newtonian with Starlight Xpress SXV-H9 CCD. *Ron Arbour*.

Ron Arbour, General Adviser to the Deep Sky Section, has discovered 2 new extragalactic supernovae. The first, SN2007av in galaxy NGC 3279, was found 2 years and 1 day after his last discovery in March 2005. The type II supernova was discovered at magnitude 15.5 with his 30cm f/6.3 Schmidt–Cassegrain telescope and Starlight Xpress SXV-H9 CCD camera on the night of 2007 March 20/21 during searches for the UK Nova/Supernova Patrol. Its position is RA 10h 24m 43.17s and Dec +11° 11' 38.3" (2000.0), which puts it 5.89" east and 14.9" south of the galaxy's nucleus. NGC 3279 is a small (2.9'×0.3') galaxy of visual magnitude 13.3 lying under the main body of Leo. The master and confirmation image shown here were obtained with Ron's home built 16 inch (40cm) f/5 Newtonian.

A second discovery followed almost immediately, for on the night of 2007 March 21/22 Ron discovered SN2007ax in galaxy NGC 2577. Particularly pleasing for him was that this was the first discovery made with the refurbished 40cm reflector. At position RA 8h 22m 43.26s and Dec +22° 33' 16.9" (2000.0) and offset only 2.6"W and 5.5"N from the centre of the galaxy, the mag 17.2 supernova was difficult to resolve and would not have been detected in the 30cm SCT. NGC 2577 lies in Cancer, and at magnitude 12.4 and 1.8'×1.1' in size, is visible in large amateur telescopes as an oval halo with a brighter core. Spectrographic measurements show this supernova to be a type Ia around maximum brightness. The two images shown here are the discovery and confirmation image, both obtained with the 40cm reflector and SXV-H9 CCD camera.

Stewart L. Moore, *Director*



SN 2007ax in NGC 2577. Discovery and confirmation image. 40cm f/5 Newtonian with Starlight Xpress SXV-H9 CCD. *Ron Arbour*.

Solar Section

2007 January

January returns revealed a slight increase in solar activity; again the southern hemisphere was responsible. There were no days when all observers reported a spotless disk although most observers reported such on Jan 25. The month opened with three spot groups from December still visible on the solar disk:

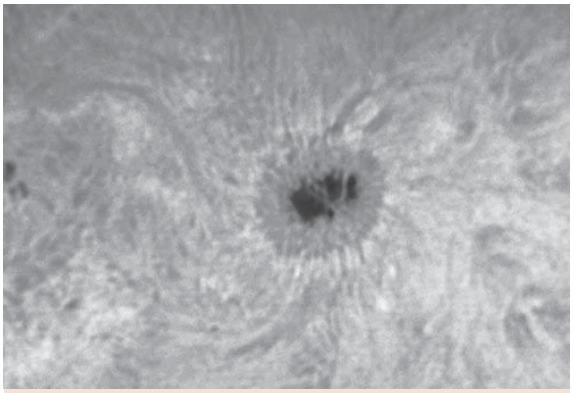
AR933, S03º/032º, a bipolar Dso type with the penumbral leader containing 3 umbrae. By Jan 4 the group had degraded to type Cao with an area of 180 millionths, the leader having expanded to encompass 2 umbrae and the follower fading rapidly. The group was nearing the western limb on Jan 10, type Cao with an area of 250 millionths and was clearly fading on Jan 11. The group was not visible by Jan 14.

AR934, N04º/035º, was a small Hax group which faded after crossing the CM. It was last observed as a faint spot on January 7.

AR935, S06º/009º, lying close to the eastern limb on January 1, type Hsx (third rotation of the spot also noted as AR923 from November and AR930 in December), with an area of 250 millionths. The spot remained unchanged crossing the CM on Jan 7 and was last seen on Jan 11 with an estimated area of 150 millionths.

AR937, S13º/346º, was first observed on Jan 10 type Hsx. The group was short lived being last seen as a small single Hsx spot on January 11.

AR938, N03º/226º, observed as a Cso type on Jan 14 near the eastern limb. The group was observed on Jan 15, 16 and 17 having faded to Bxo class by Jan 16. It crossed the CM on Jan 18 at N02º/226º consisting of 8 spots but only the largest survived on Jan 19 at N05º/223º. The group 'died' on the disk on Jan 21.



AR933 at 11:21 UT, 2007 January 4. *Dave Tyler.*

AR939, S04º/212º, appeared on the disk west of the CM on Jan 20 as a Cai group consisting of 6 small spots with a penumbral leader. By the following day the follower spot and central spot had become penumbral and consisted of 9 spots in total type Dsc with an area of 90 millionths. It was of similar appearance on Jan 23 and was last seen rounding the western limb as an Axx spot on Jan 25.

AR940, S04º/040º, first seen rounding the eastern limb on January 26 type Hsx (return of AR933). The spot clearly showed the 'Wilson effect' on Jan 26 & 27 with an estimated area of 250 millionths on Jan 28. On Jan 29 the main spot displayed an elongated umbra and a smaller penumbral spot formed ahead and north of it. The main spot was also flanked by several pores type Dai. The group was last seen on Jan 31, still type Dai with an area of 120 millionths.

AR941, S09º/007º, first reported on Jan 29 having rounded the eastern limb type Hsx. The spot was unchanged on Jan 31.

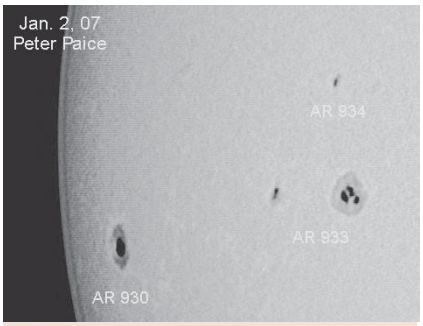
H-alpha

Prominences

9 observers reported a prominence MDF of 2.68 for January. This was a quiet month for prominences with the most spectacular activity reserved for the end of the month. On Jan 1 Lee Macdonald saw a low bright prominence and a detached prominence visible above the AA at the E limb. Monty Leventhal reported a loop prominence on the SE limb extending to a height of 37,000km on Jan 19 and a prominence on the NW limb extending to a height of 84,000km on Jan 21.

On Jan 25 Monty also reported intense activity on the eastern limb in the southern hemisphere extending 149,000km around the limb. Eric Strach saw a 'huge curved jet at 5ºS on the E limb' and a widespread hedgerow type prominence on the SW limb extending from S22º to S39º. Peter Meadows also saw a thin curved jet on Jan 25. Brian Mitchell reported many prominences seen on this date and Ernest Richardson saw one resembling a 'duck's head'. The SOHO Coronograph showed CMEs on the eastern limb on both January 24 and 25.

Monty also observed a towering hooked prominence on the NW limb extending 140,000km in height on Jan 27. Peter Meadows reported an arch prominence on the SE limb at approximately S70º on Jan 31.



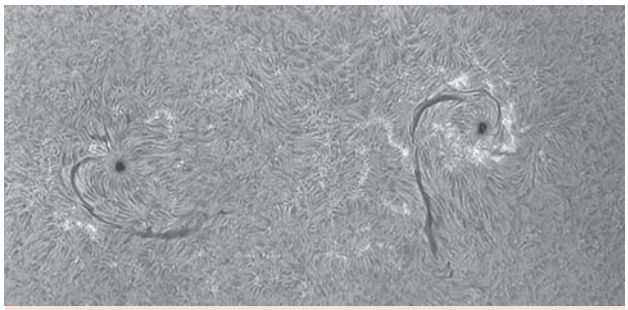
Active areas AR930, 933 and 934 imaged by Peter Paice, January 2.

Filaments

A long filament was seen across the equator extending south east for 261,000km on Jan 19. A very strong short filament was seen on Jan 21 near to AR939 plus a bright plage. On Jan 25 a filament was lying close to the E limb between AR933 and the limb. On Jan 31 a filament was seen close to the base of the arch prominence at S70º and a

BAA sunspot data, 2007 January–February

	January		February	
Day	*g*	*R*	*g*	*R*
1	3	31	2	34
2	3	36	2	32
3	3	39	2	29
4	3	36	2	25
5	3	39	2	24
6	3	38	2	22
7	3	32	2	22
8	3	36	1	12
9	3	39	1	11
10	3	37	1	10
11	3	36	0	0
12	2	25	0	0
13	2	21	0	0
14	1	17	0	0
15	1	16	0	1
16	1	14	0	4
17	1	11	1	10
18	1	20	1	13
19	1	12	2	25
20	1	18	1	17
21	1	17	1	15
22	1	18	1	13
23	1	16	1	14
24	1	16	1	11
25	0	6	1	14
26	1	8	2	20
27	1	11	1	17
28	1	13	1	13
29	2	32		
30	2	30		
31	2	30		
MDFg	1.82 (48)		1.14 (48)	
Mean R	24.25 (43)		14.56 (41)	



AR940 and 941 imaged by Peter Garbett in H-alpha on 2007 February 3.

more striking filament to the east and north of AR940 was quite curved near to the group before becoming stretched out towards the north.

Flares

A surge was reported on Jan 10 starting at 21:00 UT until 21:45 UT. A type 3B limb flare was seen on Jan 25 at S06°/049°, X-ray class C3, ending at 22:20 UT. A type 2B flare commenced at 21:15 UT on Jan 29, peaking at 21:35 and ending at 21:50 UT, X-ray class B-9 around AR940. The same flare restarted again at 22:40, peaked at 22:55 and ended at 23:10 UT, type 1B, X-ray class C1.5, AR940.

2007 February

February proved to be a quiet month in both white light and H-alpha. Solar activity fell compared with January's count with the northern hemisphere remaining almost spotless throughout. All observers recorded a blank disk on February 11 to 14 with most observers recording the same on Feb 15 and 16. The month opened with the two penumbral spots from January dominating the disk.

AR940, S04°/042°, type Dsc on Feb 2 consisted of scattered leader spots two of which had penumbrae and a large penumbral follower. Over the next few days the leader spots reduced until only the Hsx spot remained on Feb 5. This spot remained unchanged as it neared the western limb on Feb 7 and was not seen on the 8th.

AR941, S07°/007°, a single type Hsx spot with an area of 180 millionths on Feb 2. This spot crossed the CM on Feb 4 and continued its journey to the western limb largely unchanged. The spot was last seen on Feb 9 concluding its fourth rotation.

AR942, S11°/132°, was first seen on Feb 17 as a small Hsx spot. Although much smaller the next day, it developed a companion spot which was still evident on Feb 21 as it approached the CM when it was classified type Bxo. The group then faded and was not seen after Feb 23.

AR944, S10°/046°, first seen on Feb 22 at 23:05 UT rounding the eastern limb as a single penumbral Hsx spot. The spot had an area of 70 millionths on Feb 25 and remained unchanged until Feb 28 when it developed a small follower type Cki as it crossed the CM. Remarkably this spot is the fifth rotation of AR 923/930/935/941.

AR945, S07°/12°, first seen at 15:45 UT on Feb 25 as an Axx spot but had rapidly developed into a Hsx penumbral spot by 22:20 UT. The group survived as an Hsx spot during the following day but declined back to an Axx spot by Feb 28.

H-alpha

Prominences

11 observers reported a prominence MDF of 2.8 for February. Another quiet month with mostly small prominences reported especially during the first half of the month. Lee Macdonald reported a 'fair-sized' hedgerow type prominence on the NE limb on Feb 3, mostly separated from the limb by a dark band. Monty Leventhal reported a prominence in the NE quadrant also on Feb 3, extending to a height of 84,000km. A further prominence was seen in the north polar region on Feb 9 extending to 65,000km, and an arch prominence on the SE limb on Feb 10 extending to 84,000km.

A large extended prominence was observed by Monty along the SE limb on Feb 16 extending for 557,000km and 56,000km high. The following day, Peter Meadows reported a 'substantial prominence' on the SE limb but the largest prominences that he observed for the month were two spike prominences close to each other on the SW limb on Feb 28.

Filaments

On Feb 3 and 4 filaments were seen to the south and east of AR940 and to the south of AR941. A strong filament was seen to emerge from the southerly part of the group, curving gently to the east and then northward for some 12°. This filament was recorded to the east of AR940 on Feb 2, 3, 6 & 7 and was seen as a broad low prominence on the western limb once the sunspot group had rotated off. The filament emanating from AR941 curved north easterly and seemed to form a hood above the spot. By Feb 6 the 'hood' had extended to the west in an undulating shape.

A small straight east-west filament was seen on Feb 28 just to the south of AR944/940.

Flares

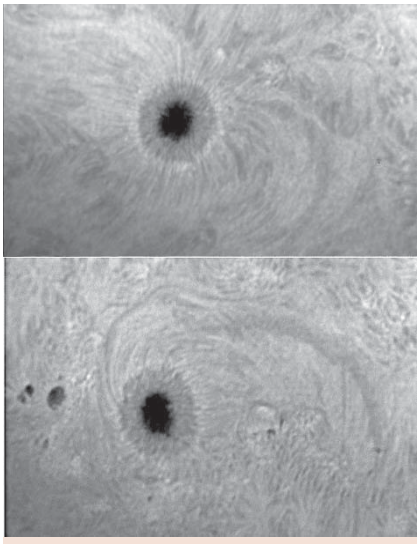
Only one flare was reported this month, on Feb 3 at 09:30 UT in association with AR940.

Lyn Smith, *Director*

North & south MDF of active areas g

	MDFNg	*MDFSg*
January	0.43	1.20 (31)
February	0.11	1.25 (33)

g = active areas (AAs)
MDF = mean daily frequency
R = relative sunspot number
The no. of observers is given in brackets.



AR941 (top) and 940 on 2007 February 3. *Dave Tyler.*