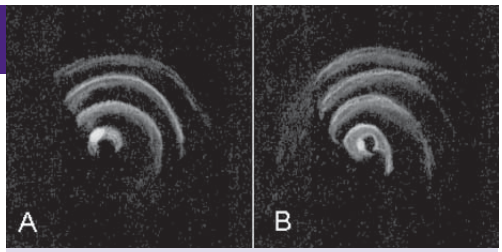
Notes and News

From the President



Comet Hale–Bopp core detail drawn by *Janet Vialls*. A: 1997 April 3, 20:35 UT, ×150; seeing fair, transparency fair. B: 1997 April 7, 20:50 UT, ×150; seeing good, transparency good.

Here we are once again: the winter is fast approaching and with it the prospect of many long clear nights of observing ahead of us. Our Association is very much one of observers. Indeed a key objective of the BAA from the outset has been to promote and help organise astronomical observation, both to aid in understanding the nature of celestial objects but also to encourage popular interest in the subject. I have read with interest the recent Letters section of the *Journal*, where the topic of visual observation has been highlighted in relation to other observing techniques, most notably those involving CCD cameras. Personally, I believe strongly that these two approaches are mutually complementary rather than competing: each furnishing something that the other does not.

If by astronomy we aim to enhance our understanding of the universe around us then we do so through our perceptions. But wait a moment, have you ever stopped to think what this means? Take for example the subject of biology. If you are interested in the nature of living things then you can use all *five* of your senses to gain an appreciation of the plants and animals around you. Not only can you marvel at the splendid visual appearance of birds or flowering plants, but you will also be able to appreciate them through your other senses: hearing the sounds they make, touching them, smelling the fragrance of an orchid or tasting the sweetness of fruit. Now compare this to the subject of astronomy, which is essentially a visual pursuit, or more correctly one in which our eyes are used to interpret nature: whether that be a faint galaxy seen through a telescope, a false-colour X-ray image of the Sun, or the lightcurve of an eclipsing binary.

I admit you may hear the sonic boom of an incoming meteor breaking up in the upper atmosphere, or listen to the 'vibrations' of the Sun when they are played back speeded up through an audio channel, but virtually *all* of what we do in astronomy is appreciated through the visual sensory stimulus and not through our other senses. So we must use as best we can our first-hand visual impressions through the telescope, alongside other techniques made feasible by modern technology, to gain as deep an understanding of the universe around us as possible.

Take for example comets, which often arrive unexpectedly from distant space shining forth in all their glory as they approach the Sun. A few weeks ago, I played a small part in confirming the latest comet discovery by David Levy (Comet P/2006 T1 [Levy]) when, in the early hours of October 3, I imaged an object which he had reported to the Minor Planet Center just a few hours earlier. I was not expecting to 'see' a bright comet on my CCD frame as only a position and magnitude had been posted by the MPC. So when it did appear, I thought for a moment that I had captured Saturn by mistake as it was so bright, and I knew that Saturn was only about half a degree away from the reported position of the object at that time.

In the end I had to admit to myself that this was indeed a bright 9th magnitude comet, one that until that time had gone unnoticed by all the large robotic telescopes surveying the skies each night. But here's the rub. David Levy had discovered this bright comet *visually* through his f/5 16-inch reflector.

IDA 'Galileo Award' presented to Bob Mizon

The Galileo Award is given once per year by the European Region of the International Dark-Sky Association (IDA) for outstanding achievements in combating light pollution in Europe. I am pleased to report that the 2006 award has been made to our very own Bob Mizon, Coordinator of the BAA Campaign for Dark Skies (CfDS).

As most of you will know, the CfDS was set up by concerned members of the BAA in 1989 to counter the ever-growing tide of skyglow which has tainted the night sky over Britain since the 1950s, and to address the related problems of light trespass and energy wastage. Bob has been doing an outstanding job as Coordinator of the CfDS for many years and so it was a real pleasure for me not only to attend the 6th European Dark-Skies Symposium in Portsmouth (of which Bob was one of the organisers) but also to be present when Bob received his much-deserved award from Bob Gent, Vice-President of the Board of Directors of the IDA.

Bob has taught astronomy to students of all ages since 1971. Since 1996, he has provided a full-time mobile planetarium service to south-central England, and has taken the experience of the night sky to nearly 60,000 people, mostly schoolchildren. He was elected a Fellow of the Royal Astronomical Society in 1985, and BAA member in 1992. He has also been associated with the Wessex Astronomical Society in various offices for many years. He is an active observer of the night sky, and lectures to societies and groups all over the country. He also writes for the astronomical press, and translates books on astronomy and meteorology from French into English. Bob is author of *Light Pollution: Responses and Remedies* (Springer–Verlag, London, 2002).

Bob Gent, Vice-President of the International Dark-Sky Association, presents Bob Mizon with the 2006 Galileo Award.

Our warmest congratulations to Bob on receiving this prestigious award.

Richard Miles, *President*

So there you have it, a graphic and timely illustration of the important role that the visual observer plays in today's astronomical world.

Comets, like deep-sky objects, are good examples of celestial objects that benefit greatly from being observed visually whether through a telescope, binoculars or occasionally with the naked eye. I always remember the view I had of the inner coma and nucleus of Comet Hale–Bopp when it made its close approach to Earth during late March in 1997. I was using a 0.35m aperture Schmidt–Cassegrain telescope visually under high power and very good seeing conditions, and I was astounded at the appearance of the inner coma. It looked like a spinning catherine wheel, surrounded by five or six concentric rings of bright and dark caused by the rapidly outgassing nucleus as it rotated. Not only was the structure so unusual, being reminiscent of drawings of some great comets of the 19th century (I had never quite believed these seemingly bizarre drawings until I finally saw these features for myself) but also the colours were quite spectacular when seen through the telescope. Although many thousands of photographs and CCD images were taken of that great comet during its apparition of 1997, none came close to representing what I witnessed with my own eyes on that particular night.

Wide-field CCD view of Comet C/2006 M4 (SWAN) on the evening of 2006 Oct 13 taken through a 60mm aperture refractor with a V filter. The image conveys something of the appearance of the comet as seen through a small telescope. *Richard Miles.*

Talking of visual observing, I include here a CCD image of this year's naked-eye comet, C/2006 M4 (SWAN), which I took through a very small telescope on October 13. I have processed the image in an attempt to convey something of its visual appearance at the time. However, you can never quite match the eye using a CCD camera when photographing a moving target like a nearby comet. In the picture, the stars come out trailed, which is never the case when the comet is seen by eye framed against a star-studded background. I hope that like me you have been able to marvel at this new visitor to our skies with your very own eyes. It is well worth it.

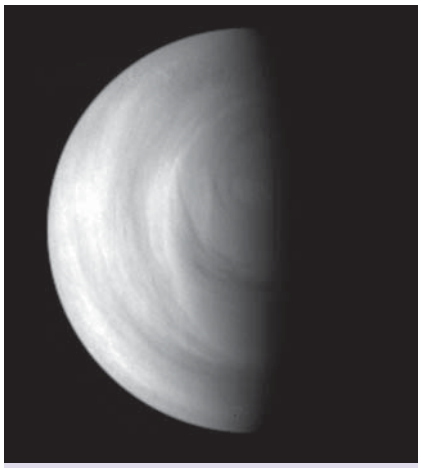
Clear skies,

Richard Miles, *President*

Mercury & Venus Section

Venus western elongation 2006, and the *Venus Express* mission

Only the latter part of the recent morning elongation – with Venus at high phase – was favourable for UK observers, but the publicity for a ground-based observing campaign through the ESA *Venus Express (VEX)* website and our *Journal* [**116**(2), 60–61 (2006)] helped bring in more data from abroad. Thanks to Jan Adelaar of the VvS (Holland), several of that organisation's observers (R. Bosman, W. Kivits, A. van Kranenburg and J. Sussenbach) sent useful images. Images were also made by D.L.Arditti, N.D.Bryant, J.P.Hatton (Holland), T.Ikemura (Japan), J.Jefferson, B.A.Kingsley (UK and Barbados), H–G.Lindberg (Sweden), F.J.Melillo (USA), T.Olivetti (Thailand), D.A.Peach (Barbados) and D.B.V.Tyler. Remarkably, Lindberg secured UV images on over 60 dates. Visual work was sent by D. Fisher, P. T. Grego and A. W. Heath (UK), G–L. Adamoli and M. Giuntoli (Italy) and D. Niechoy (Germany). Copies of the better observations have been sent at intervals to Jason Hatton for ESA, and some observers have posted their own work at the *VEX* website. Meanwhile, some of the *VEX* scientific results have been summarised at the official website and in popular reviews [for example: A. Coates, *Astron. & Geophys*., **47**(3), 13–15 (2006)].



An ultraviolet image (365nm) of the Venus southern hemisphere, taken by the Venus Monitoring Camera (VMC) on board *Venus Express* on 2006 May 15, when the spacecraft was flying at about 66,500km from the planet. The south pole is near the terminator, just above the centre of the image. The complex atmosphere that surrounds the planet is clearly visible. Near the pole spiralling clouds surround the polar vortex; away from the pole are cloud features of the upper cloud deck at approximately 70km altitude. *ESA/MPS, Katlenburg-Lindau, Germany*

Nightside observations

Following inferior conjunction (2006 Jan 13), Ikemura (2006 January 28) secured infrared images ($\lambda = 1$ micron) showing the nightside thermal emission from the planet, thereby repeating the 2004 success of C. Pellier [*Journal*, **114**(5), 241–242 (2004)]. (Ikemura and Melillo had also secured similar results just prior to inferior conjunction.) The Ashen Light – where the planet's unilluminated hemisphere appears brighter than the sky at visual wavelengths – was reported only by Niechoy, and he found it visible only near the terminator, on March 8 ('yellowish') and 13 ('grey-brown'). Unfortunately no images were available for comparison for either date.

Dichotomy

Theoretical half-phase occurred on 2006 March 26. Heath in white light saw the planet exactly dichotomised three days later, leading to the usual small phase anomaly. Venus was also precisely dichotomised on Olivetti's image of April 1, in violet light (W47 filter), leading to the usual larger anomaly at shorter wavelength.

Cusp caps

In UV light the brighter cuspidal areas (or cusp caps) were quite large, and they were widely imaged in both hemispheres. Generally they seem to have been roughly equal in size and brightness during April to September, though occasionally the N. cap seemed a little larger or brighter.

Bright areas

Other than the bright cusp caps there were several discrete bright areas at the limb: on May 4 Lindberg imaged one in UV light at the WSW (*f.*) limb, and it reappeared at the next rotation on May 8. On several images the N. cuspidal area appeared to extend southward along the evening (W; *f.*) limb, for instance to Kivits on June 10, Lindberg on July 3 and

Sussenbach on July 12, 15, 19: whether these were separate bright areas or just extensions of the cusp cap could not be ascertained.

Dark markings

Broad horizontal dark markings surrounded the cusp caps at many longitudes and the classic Y- or Ψ-shaped markings were in evidence. Sussenbach produced an impressive and almost complete UV atmospheric chart from his July 12–17 data. All of the dark markings were best recorded in the UV images, but more than once van Kranenburg simultaneously recorded a Y-shaped marking in both blue light and in the ultraviolet.

The images submitted were not numerous enough to make useful new estimates of the rotation period of the UV cloud layer from the evidence of this elongation alone, though the four-day retrograde period was sufficiently obvious in the dataset (in Peach's images of April 13 and 21, for example). However, a forthcoming report (*in press*) will present significant new BAA measurements from our 2004 data.

Infrared work

IR images of the illuminated part of the planet were mostly featureless, but Arditti, Ikemura and Peach occasionally succeeded in catching some slight structure in the clouds, in the form of vague low-contrast lighter and darker areas. Peach's best images of April 20 portray several thin dusky bands slightly inclined to the equator. The polar areas were never bright in the infrared, and were sometimes rather shaded. The markings in the IR, when visible, were clearly different (but not in inverse relation) to those imaged simultaneously in the UV. The data were insufficient to estimate the rotation period of the IR features.

All observers are thanked for their efforts, and are encouraged to continue to obtain as complete a record as possible as soon as the planet passes through superior conjunction (2006 October 27).

Richard McKim, *Director*

Asteroids & Remote Planets Section

New definitions for solar system bodies

The XXVIth General Assembly of the International Astronomical Union was held in Prague on 2006 August 14 to 25. Two resolutions were passed, after considerable discussion, relating to planets, asteroids and comets. The outcome of these resolutions is that the solar system is now made up of planets, dwarf planets and small solar system bodies (*i.e.* asteroids and comets).

Resolution 5

A **planet** is a celestial body that:

(a) is in orbit around the Sun;

(b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape;

(c) has cleared the neighbourhood around its orbit.

A **dwarf planet** is a celestial body that:

(a) is in orbit around the Sun;

(b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape;

(c) has not cleared the neighbourhood around its orbit;

(d) is not a satellite.

All other objects, except satellites, orbiting the Sun shall be referred to as 'small solar system bodies'.

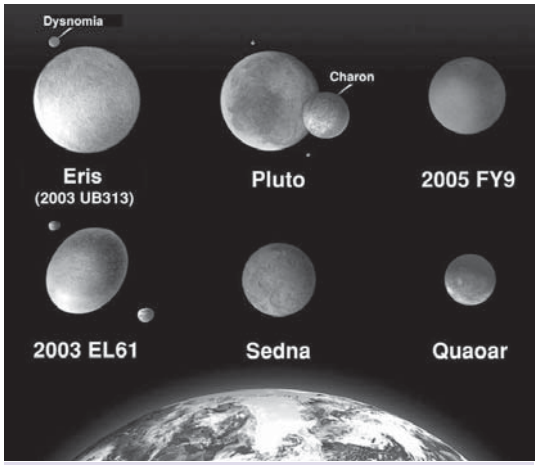
Resolution 6

Pluto is a dwarf planet and is recognised as the prototype of a new category of trans-Neptunian object. An IAU process will be established to select names for this category.

Planets

The planets are the major bodies in the solar system as known prior to March 1930 when Pluto was discovered, *i.e.* Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

Jupiter might appear to fall foul of Resolution 5, item (c) as it has not cleared its orbit of its Trojan asteroids. However due to its dominant size compared with such bodies and the chances of the planet colliding or capturing such objects being small, Jupiter retains its classification.



The largest known Edgworth–Kuiper belt objects, with the Earth shown for size comparison. *NASA, ESA & A.Field (STScI).*

Dwarf planets

Included in this category are the larger asteroids in the main and Edgworth–Kuiper belts, *e.g.* 1 Ceres, 134340 Pluto and 136199 (2003 UB313 – once informally known as Xena) Eris. Possible other candidates include 2 Pallas, 4 Vesta, 10 Hygiea, 90482 Orcus, 90377 Sedna, 136108 (2003 EL61), 136472 (2005 FY9) and 50000 Quaoar (see diagram). All these objects have a diameter greater than 200km, but no minimum size has yet been given by the IAU.

The total number in this category may be considerable. Data from the InfraRed Astronomical Satellite (IRAS) indicated that there were 30 main belt asteroids with diameters exceeding 200km. Astronomer Dave Jewitt has estimated that there are 70,000 trans-Neptunian objects with diameters greater than 100km.

Pluto

Trans-Neptunian objects in orbits similar to that of Pluto are currently referred to as Plutinos, so the need for resolution 6 is not at all clear. Plutinos are in a 3:2 resonance with Neptune in that they complete 2 orbits for every 3 made by that planet. The first Plutino to be discovered, by Jane Luu and Dave Jewitt, was 1993 RO. Other examples are 1996 TP66, 1993 SB, 1995 HM5 and 1996 TQ66.

What of the Asteroids & Remote Planets Section?

Should we rename it 'Small Solar System Bodies (Asteroids), Dwarf Planets and Pluto-Like Objects Section' – SSSB(A)DPPLOS? I think I will let the dust settle before making that proposal!

Roger Dymock, *Director*

Solar Section

2006 July

The majority of observers recorded a blank disk on July 13, 20 and 21 although there were no days in the month when all observers recorded a blank disk. Activity continues at a low level with the southern hemisphere being slightly more active than the north. Even at this stage of the solar cycle, large 'naked eye' spots continue to emerge, as with the passage of AR898.

AR897 On July 1 this Cso spot at 8ºN/6º was approaching the central meridian and was last seen on July 4, type Axx.

AR898 Had first appeared on June 27 and by July 1 was visible with the protected naked eye. Type Hkx, this slightly asymmetric penumbral spot at 5ºS/330º had an area of 310 millionths. On July 2 the group developed a small semicircle of trailing spots and by 3rd the umbral area was starting to elongate and split as the group approached the central meridian. By July 5 the spot had elongated further and had several umbrae type Cki, reaching its largest area of some 400 millionths. The group was still 'naked eye' on July 6 and 7 when it developed a small penumbral leader spot making it type Dko. It was last seen on July 9.

AR899 First seen on July 4 at 5ºS/234º, type Cso, close to the eastern limb. It attained its maximum area of 90 millionths on July 7, type Dso, before decaying. By July 8 it was type Cso with follower spots 8º to the east of the main spot, and was last seen on July 12 as a single Axx spot.

AR900 Appeared on the disk at 4ºS/139º on July 14, type Bxo. By the following day several small spots had appeared between the leading and following spots and by July 17 the group had further developed to type Dai. The group then declined and was not seen after July 21.

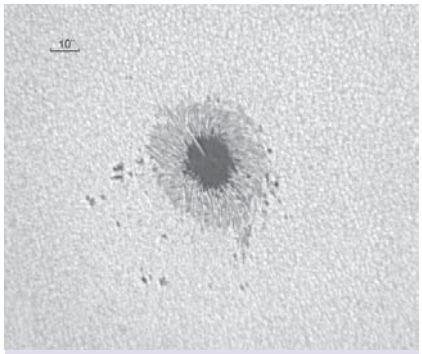
AR901 Was seen on July 22 (possibly a return of AR897 which had been recorded in a similar position on June 26) at 6ºN/009º. By the following day a small follower spot accompanied the main spot and further spots developed on July 24 making the group type Dao with an area of 90 millionths. The group started to decay to type Cso on July 26 and disappeared altogether by July 31 in a similar position as its progenitor.

AR902 Appeared suddenly on the disk on July 30 in the south west quadrant, type Bro at 10ºS/351º, and was last seen on July 31.

Hydrogen alpha

Prominences

The prominence MDF was 4.11 (10 observers). A high arch prominence was seen on the eastern limb on July 3 extending from 01ºN to 07ºN, the northern 'limb' being rather dense. A dense, oblique spike was seen on July 6 on the western limb at 53ºN and was still evident on July 8 in a similar position. On July 11 a large 'fir tree' type spike was observed on the southeast limb and developed into a 'mound' type prominence by July 15.



AR898 imaged at 08:51 UT on 2006 July 1 by Peter Garbett.

A tall pillar type prominence was seen on the north east limb on July 21. July 24 brought a high sharp jet at 59ºN on the eastern limb at 07:20 UT under excellent seeing conditions, estimated height 90,000km. By 09:11 it was slightly bent northward forming an incomplete loop towards two small prominences.

On the same day an almost detached prominence was seen on the western limb at 16ºS, pyramidal in shape with thin 'legs' connecting it to the solar limb.

Filaments

There were no remarkable filaments in the month. Several short filaments were seen at the 50º parallel, especially in the north, with small and larger prominences around the 50ºN latitude. This may well represent a fragmented circumpolar filament.

2006 August

All observers recorded a blank disk between August 4 and 7. The northern hemisphere was practically blank the entire month and overall, activity was slightly down on July.

AR902 was a short lived group last seen on Aug 2 at S9º/005º as an Axx spot nearing the western limb.

AR903 was first seen close to the eastern limb on Aug 8, S6º/152º type Bxo. The group persisted on Aug 9 but was not seen the next day.

AR904 rotated onto the disk on Aug 9 as a Hsx spot at S14º/124º, accompanied by a following penumbral spot on Aug 10, developing into a group type Ekc. This group polarised into two main spots containing several umbrae on Aug 12, developing many intervening pores and a penumbral spot on Aug 14. The group had crossed the CM by Aug 16, revealing an elongated trailing spot. This follower spot showed signs of decay by Aug 18 and by Aug 20 just the leader Hhx spot was seen near the

Aurora Section

In contrast to the hectic and very fruitful noctilucent cloud season, the aurora scene has been rather quiet. Only Jay Brausch, with the benefit of high geomagnetic latitude and clear skies, has regularly reported auroral light over the summer. Quiet glows and arcs, sometimes with a few rays, were seen in North Dakota on May 4/5, 6/7; June 5/6, 6/7 (simultaneously with an NLC band), 17/18, 27/28; July 27/28 (active rayed band) and 31/01. August was rather more lively; on 6/7 Jay saw a rayed aurora with pulsations, also seen in Colorado, Michigan, Winnipeg, British Colombia, Manitoba and Alberta where it was overhead. On Aug 19/20 Jay had a quiet arc, and auroral light was seen in Scotland for the first time this season; at Doune near Stirling Douglas Cooper photographed a fine arc with red rays. Rays were seen by Ole Skov Hansen at Kolvrå, Denmark, and in Sweden, Finland and Norway where it was coronal. Ron Livesey traces this outburst to a solar disturbance active back to February. Images of these fine displays appear on the website **www.spaceweather.com**.

Jay reported quiet aurora on August 21/22 and 26/27, then on 27/28 rayed bands were reported in Finland, Norway and Michigan. Quiet aurora followed in N. Dakota on August 28/29, 29/30 and September 3/4, 18/19, and an active rayed arc was seen on Sept 23/24, seen as quiet light by Tony Rickwood in Ullapool, Scotland. More quiet aurorae by Jay on 24/25 and 29/30 were followed by a display of active rayed arc with pulsations on 30/01. Lars Poort sent fine pictures of auroral bands taken in East Greenland in September.

Magnetometers were relatively quiet during the summer. The Potsdam daily index C9 registered 6 on July 28, August 7 and 19; David Pettitt's fluxgate reached 'major storm' on the last date.

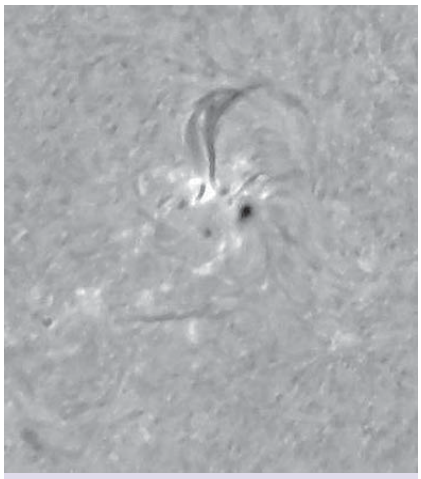
Dave Gavine, *Director*

BAA sunspot data, 2006 July–August

	July		August	
Day	*g*	*R*	*g*	*R*
1	2	30	0	5
2	2	25	1	9
3	1	22	0	3
4	1	20	0	0
5	2	26	0	0
6	2	28	0	0
7	2	30	0	0
8	2	28	1	8
9	2	25	1	12
10	1	12	1	20
11	1	11	1	21
12	1	7	1	21
13	0	2	1	22
14	1	8	1	25
15	1	12	1	23
16	1	16	1	28
17	1	18	1	22
18	1	18	1	25
19	1	18	1	21
20	0	6	1	14
21	0	1	2	22
22	1	11	1	14
23	1	17	1	17
24	1	16	1	18
25	1	17	1	19
26	1	16	1	20
27	1	15	1	30
28	1	15	1	27
29	1	16	1	22
30	2	26	1	16
31	2	19	2	27
MDFg	1.16 (51)		0.97 (56)	
Mean R	17.09 (43)		16.44 (47)	

western limb. This spot was last seen on Aug 21 right on the western limb.

AR905 was first seen on Aug 21 near the eastern limb, type Cso at S6º/328º. By Aug 25 the leader spot had elongated with two umbrae, type Eao with an area of 230 millionths, but the follower spot had started to fade. The group was straddling the CM on Aug 26 and 27. The lead spot became more asymmetric on Aug 26 and by Aug 27 had split into several separate umbrae accompanied by intense H-alpha activity. On Aug 28 there were six umbral spots with the leader clearly penumbral. The follower spot was becoming detached from the group (by some 12º on 28th) and by Aug 30 it had disappeared. By the end of the month the group was still visible approaching the western limb as type Cai with an area of 80 millionths. AR905 was a particularly bright group in CaK remaining to mark the area where the trailing spot had been.



Plume from AR905 recorded by Eric Strach at 11:33 UT on 2006 Aug 28.

North & south MDF of active areas g

	MDFNg	*MDFSg*
July	0.40	0.76 (34)
August	0.02	1.07 (37)

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

Hydrogen alpha

Prominences

The prominence MDF was 3.99 (12 observers). Most prominences were relatively small and insignificant. Some small but very bright prominences heralded the presence of AR903 and AR904 on the eastern limb.

Filaments

There were few filaments during the month other than those associated directly with spot groups. The most striking was observed by Eric Strach on Aug 28 at 10:01 UT associated with AR905, comprising a dark, almost straight plume emanating from the leader spot. Over the next 90 minutes the plume developed into a giant loop with bright plages at its base and then into a triple loop with a new plume arising from the west of the group. By 11:33 UT the western plume had disappeared (see image). Eric Strach concludes that this event was the 'almost explosive break-up of the leader spot which had caused an outpouring of energy in the form of flares, plume-like eruptions and scattering of flare material'.

Flares

Flares were reported in association with AR904 and AR905 and were seen by observers on August 10, 13, 15, 27 and 29. Aug 28 was a particularly rich day with several observers reporting continuous flare activity between 07:45 and 16:20 UT. Alan Heath reports a weak flare by a filament near AR905 at 14:10 UT with weak chromospheric darkening either side of the filament.

Lyn Smith, *Director*

50th anniversary celebrations of the Dundee Astronomical Society

Dundee Astronomical Society celebrated its 50th anniversary on September 15, with a Reception at Dundee University and an entertaining public lecture 'The Magic of the Cosmos' by the Astronomer Royal for Scotland, Prof John Brown, organised jointly by the local branch of the British Association for the Advancement of Science. As a token of gratitude the Society conferred Honorary Membership upon former Observing Director Dr Sandy McKenzie, and the first President, Mr William Dow, formerly Physics master at Morgan Academy, was made Honorary Vice President for his work in getting the early Society organised and in planning the aurora observatory on Powrie Brae for the International Geophysical Year.

The photo shows, left to right: Dr Sandy McKenzie, Mike Fenwick (Chairman), William Dow, Dr Dave Gavine (Hon. President). *Photo: Ken Kennedy.*

Dave Gavine, *Director, BAA Aurora Section*

Comet Section

Comet prospects for 2007

2007 is a poor year for returning comets and whilst it sees the possible return of 30 periodic comets, only a few of these are likely to come within range of visual observation with moderate apertures. 8P/Tuttle may reach binocular brightness at the end of the year, though strictly it belongs with the comets of 2008. The highlight may be comet 2006 P1 (McNaught), although it has a faint absolute magnitude and may not survive perihelion.

Theories on the structure of comets suggest that any comet could fragment at any time, so it is worth keeping an eye on some of the fainter periodic comets, which are often ignored. This would make a useful project for CCD observers. As an example, 51P/Harrington was observed to fragment in 2001. Ephemerides for new and currently observable comets are published in the BAA *Circulars*, Comet Section Newsletters and on the Section, CBAT and Seiichi Yoshida's web pages. Complete ephemerides and magnitude parameters for all comets predicted to be brighter than about magnitude 21 are given in the International Comet Quarterly Handbook; details of subscription to the ICQ are available on the Internet. The Section booklet on comet observing is available from the BAA office or via the BAA Web page, **www.britastro.org**.

2P/Encke puts on a brief showing in the UK evening sky in late March and early April just before perihelion, when it may be a binocular object in Pisces and Aries. After perihelion it will be visible passing through the SOHO LASCO field or that of its successor, STEREO. This is comet **Encke's** 60th observed return to perihelion since its discovery by Mechain in 1786. The orbit is quite stable, and with a period of 3.3 years apparitions repeat on a 10-year cycle. This year the comet is briefly seen from the northern hemisphere prior to perihelion, with rather better views from the southern hemisphere after perihelion, when the comet is often brighter. BAA members have been observing this comet for over 50 years and there is little evidence for a secular fading. The comet is the progenitor of the Taurid meteor complex and may be associated with several Apollo asteroids.

29P/Schwassmann–Wachmann is an annual comet that has outbursts, which in recent years seem to have become more frequent and were more or less continuous in 2004. At many recent outbursts it has reached mag 12. It spends the first quarter of the year in Taurus before sinking into solar conjunction. It emerges into the morning sky of Auriga in August, reaching opposition there at the end of the year. The comet is an ideal target for those equipped with CCDs and it should be observed at every opportunity. It is again well placed this year and UK based observers should be able to follow it for much of the year.

96P/Machholz should reach 2nd magnitude as it passes through the SOHO coronagraph field at perihelion in early April, however it will be 9th magnitude by the time its elongation increases sufficiently for ground based observation in late April. UK observers may pick it up in the morning sky, but it will be a fading telescopic object. The orbit is very unusual, with the smallest perihelion distance of any proven short period comet (0.13 AU), which is decreasing further with time, a high eccentricity (0.96) and a high inclination (60°). Studies by Sekanina suggest it has only one active area, which is situated close to the rotation pole and becomes active close to perihelion. The comet may be the parent of the Quadrantid meteor shower.

Although **8P/Tuttle** doesn't reach perihelion until 2008, it is likely to be one of the brighter objects for visual observers in 2007. It could be a binocular or even naked eye object at the close of 2007 as it makes a close pass of the Earth at 0.25 AU at the beginning of the New Year.

2006 HR30 (P/Siding Spring) was discovered during the Siding Spring Survey with the 0.5m Uppsala Schmidt on 2006 April 20.78. With a period of 22 years and perihelion at 1.23 AU it seemed a likely cometary candidate and this was finally demonstrated in early August. Reaching perihelion in early January 2007 the comet could reach

Comets reaching perihelion in 2007

Comet	*T*	*q*	*P*	*N*	H_1	K_1	*Peak mag*
P/Siding Spring (2006 HR30)	Jan 2.3	1.23	21.8	1 ?	10.0	10.0	10
McNaught (2006 P1)	Jan 12.9	0.17			10.0	10.0	2
99P/Kowal	Jan 15.7	4.72	15.1	2	4.5	15.0	17
P/LONEOS (2001 WF2)	Feb 6.2	0.98	5.02	1	18.0	10.0	15
LINEAR (2006 M1)	Feb 13.9	3.56			8.5	10.0	17
P/Petriew (2001 Q2)	Feb 24.6	0.94	5.47	1	11.0	10.0	12
LONEOS (2005 EL173)	Mar 6.1	3.90			11.5	5.0	17
McNaught (2006 K3)	Mar 13.4	2.50			8.0	10.0	14
106P/Schuster	Apr 2.2	1.56	7.31	3	10.0	15.0	15
96P/Machholz	Apr 4.6	0.12	5.24	4	13.0	12.0	2
2P/Encke	Apr 19.3	0.34	3.30	59	10.5	15.0	3
17P/Holmes	May 4.5	2.05	6.88	9	10.0	15.0	17
P/LONEOS–Tucker (1998 QP54)	May 12.2	1.88	8.60	1	9.7	15.0	16
135P/Shoemaker–Levy	May 31.0	2.71	7.48	2	6.5	20.0	16
128P/Shoemaker–Holt (A)	Jun 13.6	3.07	9.59	2	4.6	15.0	14
128P/Shoemaker–Holt (B)	Jun 13.7	3.07	9.59	1	4.6	15.0	?
156P/Russell–LINEAR	Jun 17.4	1.59	6.83	3	13.0	15.0	18
133P/(7968) Elst–Pizarro	Jun 29.4	2.64	5.61	4	12.0	10.0	17
87P/Bus	Jul 7.2	2.17	6.51	4	10.0	15.0	16
P/Mueller (1998 U2)	Jul 7.9	2.03	8.73	1	11.0	15.0	17
108P/Ciffreo	Jul 18.0	1.72	7.26	3	9.2	15.0	15
McNaught (2006 K1)	Jul 20.6	4.43			7.5	10.0	17
P/NEAT (2002 O5)	Jul 26.3	1.17	4.98	1	19.0	10.0	16
125P/Spacewatch	Aug 10.7	1.52	5.53	3	15.5	10.0	18
P/Hoenig (2003 R5)	Sep 11.3	0.05	3.99	2	12.5	5.0	6?
D/Schorr (1918 W1)	Sep 26.4	2.85	8.51	1	10.0	15.0	18
70P/Kojima	Oct 5.9	2.01	7.06	5	11.0	15.0	17
136P/Mueller	Oct 22.2	2.96	8.57	2	11.0	10.0	17
50P/Arend	Nov 1.2	1.92	8.26	7	9.5	15.0	14
75D/Kohoutek	Nov 3.3	1.80	6.70	3	10.5	10.0	13?
D/Blanpain (1819 W1)	Nov 3.4	0.94	5.16	1	10.5	10.0	?
NEAT (2006 K4)	Nov 29.4	3.19			6.0	10.0	13
P/Jedicke (1995 A1)	Dec 4.1	4.09	14.35	1	9.5	10.0	18
D/Denning (1894 F1)	Dec 4.3	1.63	9.69	1	10.5	15.0	14?
P/Shoemaker–Levy (1990 V1)	Dec 12.9	1.46	16.41	1	10.5	10.0	13
P/LINEAR–Mueller (1998 S1)	Dec 16.1	2.55	9.13	1	5.6	15.0	13
93P/Lovas	Dec 17.3	1.70	9.20	3	10.1	10.7	12

The date of perihelion (T), perihelion distance (q), period (P), the number of previously observed returns (N), the magnitude parameters H_1 and K_1 and the brightest magnitude are given for each comet. The date of return of D/Schorr and D/Denning must be regarded as highly uncertain, whilst 75D/Kohoutek was missed at the last two returns. If there is an identity between D/Blanpain and 2003 WY25 (P/Catalina) it will not return in 2007. Note: $m_1 = H_1 + 5.0 * \log(d) + K_1 * \log(r)$

10th magnitude around this time. It can approach to within 0.6 AU of Jupiter and a similar distance from the Earth.

Southern hemisphere observers will get a good view of comet **2006 P1 (McNaught)**, but it will remain invisible from the UK. It too will pass through the fields of the satellite coronagraphs and could be an impressive 2nd magnitude in mid January. It emerges from conjunction fairly rapidly and it could be visible a week after perihelion, assuming that it survives, as a 5th magnitude object. It fades rapidly and by the end of the month will be 9th magnitude.

The other periodic and parabolic comets that are at perihelion during 2007 (see Table) are unlikely to become brighter than 13th magnitude or are poorly placed. Ephemerides for these can be found on the CBAT WWW pages. Three were only seen once and have not been seen since their discovery, whilst D/Kohoutek has not been seen for two returns, and for all four the likely perihelion dates and magnitudes are extremely uncertain.

Looking ahead to 2008, the brightest comets are 6P/d'Arrest (10th mag), 8P/Tuttle and 85P/Boethin (8th mag) and there may be more than 40 fainter ones.

Jonathan Shanklin, *Director*

References and sources

Belyaev N. A. *et al.*, *Catalogue of short period comets*, Bratislava, 1986

Hoenig S. F., 'Identification of a new short-period comet near the Sun', *A&A* (in press)

Kozlov E. A. *et al.*, *Catalogue of short period comets, 2nd edn,* **http://astro.savba.sk/cat/**, 2003

Kronk G. W., *Cometographia*, Cambridge University Press, 1999, 2004 and **http://www.cometography.com**

Marsden B. G. & Williams G. V., *Catalog of Cometary Orbits*, 16th edn, IAUCBAT, 2005

Minor Planet Circulars, **http://cfa-www.harvard.edu/iau/services/MPC.html**

Nakano Notes at **http://www.oaa.gr.jp/~oaacs/nk/**

Nakano S. & Green D. W. E., *eds.*, *Intl Comet Quarterly 2006 Comet Handbook*, 2005

Shanklin J. D., *Observing Guide to Comets*, 2nd edn, BAA, 2002

Variable Star Section

The OJ287 observing campaign hots up

In the August 2006 issue of the *Journal* [116(4), 163–164] I gave details of the BAAVSS observing campaign to monitor the binary black hole OJ287. The campaign is now in full swing for the 2006/2007 season, now that solar conjunction is over. During the summer break, new analysis was done on the BAAVSS & TA data by Dr Mauri Valtonen (Dept of Physics and Tuorla Observatory, University of Turku, Finland & Dept of Physics, Univ. of the West Indies, Trinidad) and Dr Mark Kidger (Herschel Science Centre, European Space Astronomy centre, Villafranca Tracking Station, Madrid, Spain) and Dr Harry Lehto (NORDITA, Denmark). A detailed examination of these data from the past 15 years, and especially the last 12 months, has led to some interesting conclusions.

Firstly the expected 2006 outburst actually occurred in October/November 2005. How can this be? The prediction for the 2006 outburst came from analysis of previous outbursts, especially that of 1994, which was the best observed ever. If the date for the 1994 outburst was wrong however, the prediction for the next outburst will also naturally be wrong. Using the date of the 2005 outburst to fix the calculations, it appears that the 1994 outburst actually occurred during solar conjunction of that year, several months earlier than originally thought. The few observations obtained in the morning sky during October & November 2005 were invaluable.

Secondly, Dr Valtonen has been running a computer model of OJ287, with parameters for the two black holes revised to take into account our amateur data obtained from the 1990s to the present. From his calculations, he has increased the mass of the primary black hole from 17 billion to 19 billion solar masses, and increased the precession rate of the orbit of the secondary black hole from 33 to 39° per orbit.

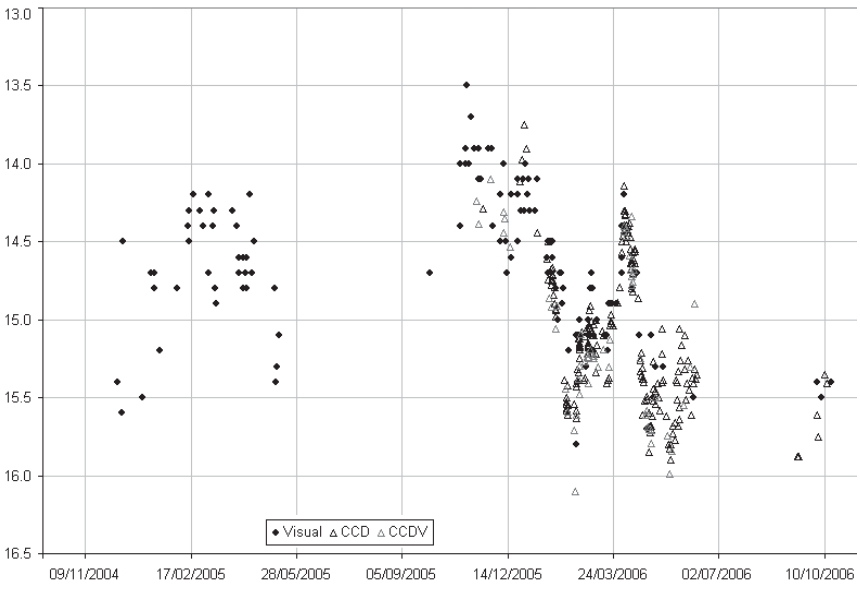
Finally, it is now clear that the 2005 outburst does not fit a stable period. Because of the pericentre advance, a significant phase jump occurs after a period of time, resulting in a non-periodic binary black hole system. OJ287 is only periodic for ~50 years or so at a time, before the period breaks down – which it appears it has just done. Has amateur data ever had such a dramatic impact as this in the past? It's unlikely that it has!

This remodelling of the black hole and orbital parameters has resulted in a new date for the next predicted outburst of OJ287. Dr Valtonen has been brave enough to narrow the predicted date of the peak of the next outburst to 2007 September 15 – just past solar conjunction. To make matters even more interesting, a rival model has been proposed by Dr Esko Valtaoja (Turku, Finland) who predicts that the next outburst will peak around 2007 January. The Valtonen prediction goes further, suggesting that OJ287 will remain in a bright state from 2007–2010, with a new set of outbursts starting again in 2016, and the bright state lasting until 2030!

This now makes our aims for the 2006/2007 season very straightforward – to monitor OJ287 at every opportunity, and simply to see who is correct. Both visual and CCD observations are needed until the end of 2007 at least. Several measures per night are requested, as OJ287 has a very active quiescence.

Details on how to report observations, and daily updated light curves can be found on the OJ287 website **http://www.garypoyner.pwp.blueyonder.co.uk/oj_camp.html.**

Gary Poyner



Recent BAAVSS and TA visual and CCD observations of OJ287.

Meteor Section

Good prospects for the Geminids in December

In most years, August's Perseids probably attract the majority of attention from meteor observers hoping to enjoy a few nights of higher activity. This year, however, unfavourable lunar phasing rather limited the view: bright moonlight swamped all but the brightest meteors close to the shower's August 12–13 peak. Some observers and local society groups persevered in the unfavourable conditions, and the Meteor Section has received a few reports indicating observed rates around 15 Perseids/hr in the bright skies close to maximum – maybe a third of what might have been expected in dark conditions. Circumstances will be a lot more favourable in 2007.

Meanwhile, the Geminids offer the prospect of good activity to enliven mid-December nights. Active from December 7 to 16, the shower is badly affected in its initial stages by strong moonlight (Full Moon is on Dec 5). By the time Geminid activity begins to rise markedly, however, around December 10–11, a gradually-widening window of darker evening hours opens. Maximum activity is expected around Dec 14d 05h UT, meaning that best rates for observers in western Europe will probably be found on December 13–14. On this night, a Wednesday to Thursday, the Moon, by now a broad waning crescent, won't rise until after 01h local time, affording good opportunities for dark-sky observing with the Geminid radiant (just north of Castor) high in the southeastern sky.

In recent years the Geminids have been the most active of the regular annual showers, with peak corrected Zenithal Hourly Rates as high as 140 being found on occasion. In good, dark skies with the radiant well up, observed rates of up to 80/hr have been reported. Often the meteors seem to come in clusters of up to six per minute, with brief lulls. Given clear conditions, we can hope for more of the same in 2006.

For an interval of about 36 hours centred on the maximum, Geminid rates are a match for those of the Perseids at their best, and watches on December 12–13 and 14–15 could also prove very productive. There is clear evidence for particle sorting in the Geminid stream, such that larger material – which produces brighter meteors – is encountered after visual rates reach their peak: the evening of December 14–15 may well be graced by one or two exceptionally bright events.

The Geminids are produced by debris laid down by asteroid (3200) Phaethon and as a result of their 'rocky', more robust nature often survive atmospheric passage longer than the dusty meteoroids in cometary streams such as the Perseids. Coupled with a relatively low atmospheric entry velocity of 35km/s, this can result in some Geminids being long, slow meteors, flaring and flickering in flight – the shower is a good photographic target.

The Geminids' current high activity levels are believed to result from favourable encounter circumstances, whereby we run through a densely-populated part of the Phaethon debris stream. The orbit of this material is evolving quite rapidly however, and it is likely that, over timescales of decades, we shall see the Geminids decline in activity. Observations are needed on every possible return to monitor the shower for possible changes.

The Geminids have enjoyed excellent coverage from BAA observers during the 1990s and in 2001 (paper in press). Subsequent returns have suffered from poor weather or moonlight. Last time they were seen reasonably well, in 2003, the Geminids produced numerous bright meteors on the night of December 14–15: circumstances that should recur in 2007. Observations of the 2006 Geminids would certainly be welcomed to extend the Meteor Section's good record on this shower. Reports of observations made by standard methods[1] (**http://www. britastro.org/meteor**) will be welcomed by the Director.

A Perseid meteor captured on an Astrovid camera system by Alex Pratt from Leeds on 2006 August 10–11 at 23:13:39 UT. Alex reports that this setup is less prone than conventional photography to the adverse effects of bright moonlight.

Neil Bone, *Director*

1 Bone N., *J. Br. Astron. Assoc.*, **114**(4), 219–222 (2004)