Comet Section

2006 P1 (McNaught) – a Great Comet!

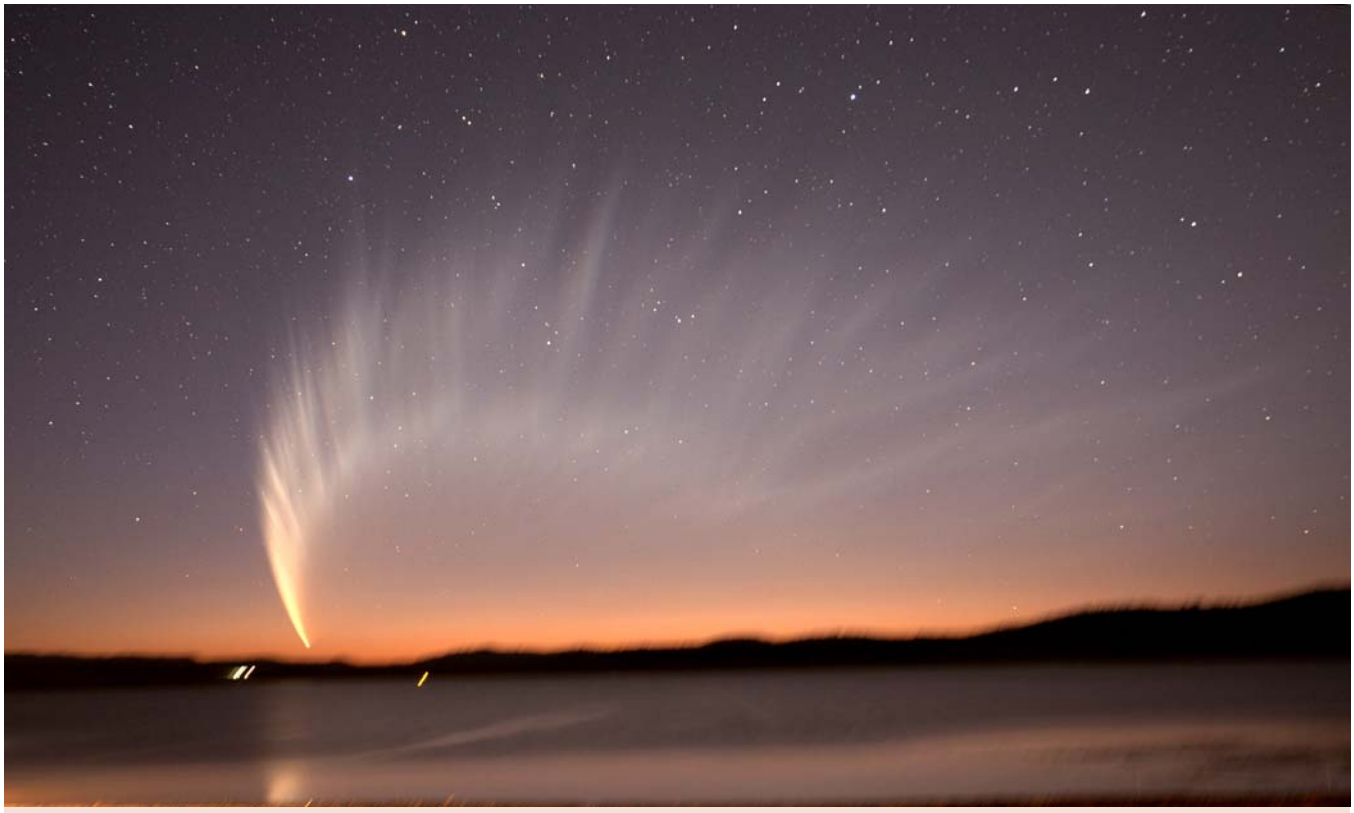
Image by Michael Jäger on 2006 November 15.

Photograph by Jonathan Shanklin in Cambridge, 2007 Jan 10 at 17:03 UT. Nikon D70, 200mm at f/6.3, 1/5s at ISO 1250.

Rob McNaught discovered his 31st comet, with the 0.5m Uppsala Schmidt camera at Siding Spring, on 2006 August 7.51. This was the 29th comet discovered with the telescope since 2004, when the Siding Spring Survey began. The Siding Spring Survey is the southern element of the Catalina Sky Survey, which includes telescopes at Catalina and Mt Lemmon in Arizona. The comet was 17th magnitude at discovery. The orbit suggested that it would be a bright object in the SOHO & STEREO fields when it reached perihelion at 0.17 AU on 2007 January 12.7. Once the orbit became reasonably well known, speculation as to the comet's likely brightness began. The initial indications were not that favourable, with the available CCD magnitudes indicating an absolute magnitude on the limits of survivability for the comet's relatively close pass to the Sun. However, it is often the case that CCD magnitudes are closer to the nuclear or m_2 magnitude, than they are to the visual or m_1 magnitude. Would this be the case for this comet?

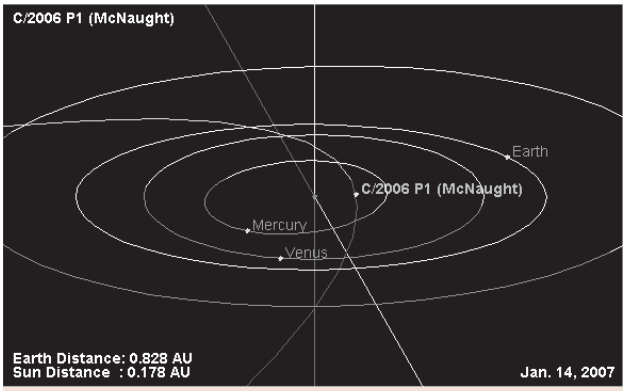
The comet came within visual range in September, earlier than expected from the CCD observations, with visual observations continuing into November, by which time it had reached 9th magnitude. It then dropped too low into the twilight sky for visual observation. As the arc of observation increased it appeared that the comet was brightening fairly rapidly, perhaps as 15 log(r). A simple linear extrapolation then suggested that we could have a daylight comet in January. I hinted that this might

The comet over Bournemouth Pier, January 10 at 17:08 UT. *Photo by Jeremy Calderwood.*



The comet in its full glory in the southern hemisphere. Image by Terry Lovejoy on January 20.429. The 50° wide field of view shows the enormous striated dust tail of Comet McNaught over Lake Leslie, near Warwick, Queensland. Canon EOS 300D, 172s f/3.2 at 23.0mm, ISO200.

A Great Comet! (continued from p. 58)



Orbit diagram for comet 2006 P1 (from **http://www.astroarts.com/products/orbitviewer/**)

be the case on the Section Web page and in a BAA e-circular issued on November 24, but it is well known that many comets appear to brighten more slowly as they approach closer to the Sun, in which case the extrapolation would be a long way out. In many cases this is just an appearance, caused by a change in aperture and magnification and a growing coma diameter as the comet approaches the Earth, and there is often little substantial change in the light curve.

Some observers imaged the comet in early December, although images posted on the Internet often gave no scale or orientation, making interpretation difficult. The preliminary light curve at this point suggested that the comet could reach –4, however the slowdown in brightening particularly applies to 'new' comets from the Oort cloud on their first pass through the inner solar system. The orbit showed that this was just such a comet, so caution suggested that it was unlikely to be visible from the Northern Hemisphere. I did however alert observers to the possibility of sighting the comet in early January, albeit in bright twilight, through the Section Web pages.

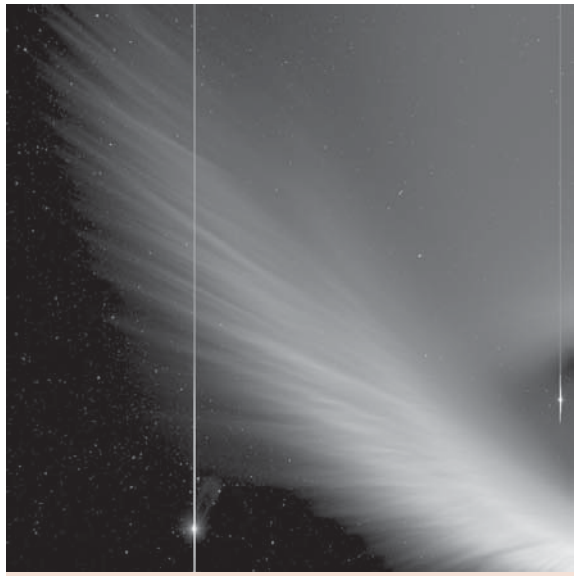
As the comet drew closer to the Sun, visual observations were attempted and it became evident that the comet was significantly brighter than indicated by the CCD observations. Michael Jäger imaged the comet in mid-November, and Bjorn Granslo obtained a visual observation on December 29, estimating it at 3.9. At the beginning of 2007 the comet appeared to be around 2nd magnitude, a little fainter than the simple extrapolation. Being optimistic, the indications were still that the comet could be as bright as Venus, and perhaps brighter if there was significant forward scattering when it reached a large phase angle close to the time of perihelion. The scattering angle was less than 40° from January 13 to 15, which could give a 10-fold (2 magnitude) increase in brightness.

In the newsletter written at the beginning of January (available on the Section Web page), I hoped that by the time the copy was received observers would have seen a Great Comet in the evening twilight with a long tail, and perhaps even have witnessed it during the daytime. They did indeed! Observers in the UK were particularly lucky when much of the country was blessed with clear skies over January 10 and 11. I received more observation reports in a short space of time than I can ever recall and I would like to thank everyone for their prompt reporting. So many reports were received that I have not been able to respond to individual submissions. The comet was a spectacular sight in the evening twilight with a tail a few degrees long, and so obvious that many casual 'discoveries' were made, as the news media seemed generally unaware of the comet and had not alerted the public.

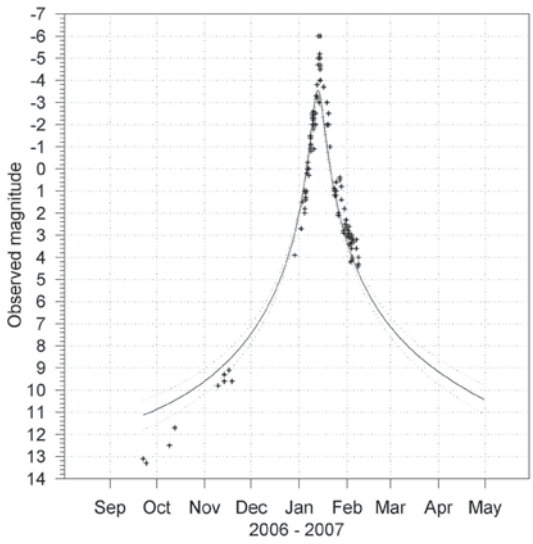
Following perihelion the comet was visible in the SOHO LASCO C3 field from January 12 to 15. It was so bright in the LASCO field that it completely saturated the detectors; however a spectacular image was fortuitously obtained whilst testing the new STEREO SECCHI coronographs on the 'A' satellite. Richard Miles was able to take photometric images of the comet in daylight on January 14.64 (see page 92), and calculated a precise magnitude of –5.0 for the nuclear region.

The best fit light curve gives a peak magnitude of –3.5, however the actual peak magnitude is around two magnitudes brighter, and it was clearly significantly brighter after perihelion than it was before perihelion. The excess magnitude at perihelion is roughly that expected from forward scattering, and future work will refine the forward scattering parameter. As a wide range of instrument apertures was in use over the apparition, an aperture correction will need to be applied. Using the standard value of 0.0033 per mm of aperture gives a magnitude equation of $m = 4.9 + 5 \log(d) + 10.6 * \log(r)$, however a preliminary analysis suggests that a larger aperture correction may apply to this comet.

As the comet drew out into the dark skies of the Southern Hemisphere some very spectacular images were obtained showing fan-



The SECCHI/HI-1A instrument on the NASA STEREO-A (Ahead) spacecraft took this image on 2007 January 17. The full field of view of the HI instrument (a wide-angle sky imager) is centred at about 14° from the Sun's centre and is 20° wide. The comet tail is approximately 7° in length and shows multiple rays.



The observed lightcurve of comet 2006P1.

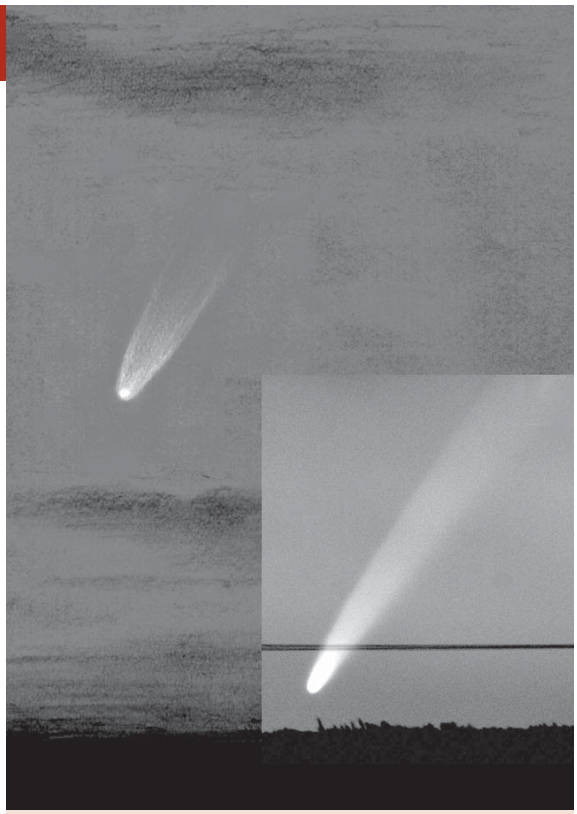
From the President

In the February issue of the *Journal*, written last December, I looked forward to what astronomical phenomena we might expect to see in our skies during 2007. Of course many events such as solar and lunar eclipses can be predicted with high accuracy, but I also mentioned that others might appear as a welcome surprise to amaze and delight us. I knew at that time that Comet McNaught was due to make a close perihelion passage on January 12 and so I was keeping my fingers crossed that this might be one such spectacular event. Well, we were certainly not disappointed in that in early January the comet began to blaze forth as seen by northern hemisphere observers. I hope you yourself were able to view the spectacle.

We have to thank Rob McNaught, a one-time BAA member and recipient of the Merlin Medal presented to him in 1987, for having discovered this welcome visitor to the Solar System last August when it was just a faint diffuse 17th magnitude moving object on CCD images taken from Siding Spring in Australia – see the Comet Section's *Notes and News* for a fuller account. By January 10, Comet McNaught had brightened dramatically, reaching magnitude –2.5 and displaying a tail several degrees in length. More was to come however as the deep-frozen mass of dust, water ice and hydrocarbons approached to within 0.17 AU of the Sun when it was subjected to intense heating resulting in the release of enormous quantities of water vapour, gas and dust. By this time the comet was heading southwards but here in the UK we had one last chance to observe McNaught on January 14 when just 5° from the Sun, as by then its brightness had exceeded magnitude –5 such that it could be seen in broad daylight! A report of my daytime photometric observations can be found in the Observers' Forum section of this issue (page 92).

For myself and many others, Comet McNaught will be remembered as the 'Great Daylight Comet of 2007'. For several days post perihelion, observers in the southern hemisphere were treated to a great spectacle of nature as the cometary material ejected from the nucleus described a great undulating arch across the entire western horizon after sunset. Indeed, witnessed from Australia or Chile for example, the magnificent sight of Comet McNaught rivalled that of any of the brightest comets of the last century.

One question I am left asking myself is, 'Why was there so little reported about it by the media here in the UK?' Maybe in other countries things were different, but here I heard nothing about it on TV or radio, which seemed to me rather a shame: a lost opportunity maybe? I know of a few people, myself included, who approached their local TV/radio or newspaper to see if the media were interested but without success. Here at the BAA, we did discuss the idea of prompting the press and TV but we recognised that if we did there was a good chance that the majority of the public would be disappointed, mainly because this comet although bright was also located relatively close to the Sun and would be missed by most casual observers. The January weather here in the UK was also an issue as was the risk that inexperienced people might by accident view the Sun through binoculars or a telescope damaging their eyes as a result.



Drawing of comet C/2006 P1 (McNaught) as seen from Stourton Caundle, Dorset on 2007 Jan 05 at 17:10 UT using 11×80mm binoculars (coma magnitude = 1.0, tail length = 0.25°). *Inset:* CCD image taken on 2007 Jan 10 at 17:17 UT from the same location using a 60mm refractor and V filter, showing the comet at an altitude of just 2° (coma magnitude = –2.5, tail length = >2°). The black 'stripe' across the image is made by two power cables, seen edge-on, strung between telegraph poles on the horizon. *Drawing and photo by Richard Miles.*

tastic striations in the tail, that were so bright and so far from the nucleus that they were seen from the UK (see Nick James' photo on p. 107), despite the comet itself never rising from these latitudes. The display was highly reminiscent of de Cheseaux's comet of 1744, which displayed multiple tails in the pre-dawn skies of early March that year. In addition to the striations, the comet also showed a sodium tail, first seen in comet Hale–Bopp, and this can be seen in Gordon Garradd's image on the front cover.

Some northern observers with access to remote observatories have continued to image the comet, which is now only visible from the Southern Hemisphere. Some of these show jet activity from the nucleus, together with halo structures, much as was seen in comet Hale–Bopp. As shown in the lightcurve the comet will fade rapidly, but as a southern circumpolar object will be visible telescopically until June or July.

For more images and information about the comet see the Section Web page at **http://www.ast.cam.ac.uk/~jds**, and amongst others Rob McNaught's page on the comet at **http://msowww.anu.edu.au/~rmn/C2006P1.htm** or Terry Lovejoy's page at **http://www.pbase.com/terrylovejoy/2006p1**.

Jonathan Shanklin, *Director*

(For more images of Comet McNaught see p.107).

An important landmark this month is the 50th anniversary of the *Sky at Night* TV programmes, which I remember in the early days had a special appeal to youngsters, especially those who were able to sit up on a Sunday evening until gone 11pm to hear and see Patrick Moore blaze forth. Indeed coincidentally, a bright comet, Arend–Roland (1957III) heralded the first showing of the programme on TV all those years ago, the comet being visible in the evening sky as it moved northwards towards the end of April of that year. Now we can celebrate both the anniversary of the *Sky at Night* and the appearance of another spectacular comet, McNaught, as a fitting tribute on this special occasion.

Patrick, of course, is very dear to our hearts here at the BAA and I am sure that you would like to join with me in thanking him for all of the joy and inspiration he has engendered in us by way of the *Sky at Night* over the years. What a splendid achievement this has been. Our very best wishes, Sir Patrick.

Richard Miles, *President*

Solar Section

2006 November

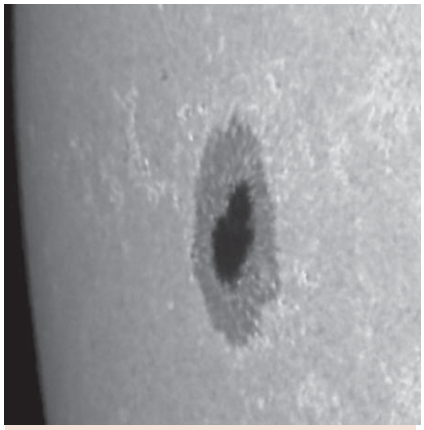
Solar activity increased in November and again the southern hemisphere was the most active. Most observers reported a blank disk from Nov 21 to 24 and all observers recorded the 22nd and 23rd as spotless.

AR921 survived from October at a mean S7°/138° type Eai on Nov 1 with an area of 220 millionths. The group was widely spread containing two penumbral leader spots and a penumbral follower with trailing spots translating into a distance of 182,000km for the whole group end to end. By the next day the span had increased to 13° with a total area of 310 millionths, the follower penumbral spot consisting of four umbrae. The group passed the CM on Nov 3 as a string of penumbral and other spots with largest spot as the leader. The group had started to decay by Nov 6 and the following penumbral spot had reformed to become the largest spot, by the merging of several other spots. The group was last seen on Nov 9 type Eso near to the western limb.

AR922 also survived from the previous month at S13°/126° type Cso on Nov 1. Six satellite spots developed, and by Nov 3 it was small Dac group 100 millionths in area, subsequently decaying to a single Hsx spot by Nov 6.

AR923 was first observed on Nov 8 as a moderately size Hkx spot S5°/005° with an estimated area of 850 millionths. This spot dominated the solar disk during the next few days, changing shape slightly. By Nov 13 it was near the CM and its elongated umbra had developed a split with a reduced area of 720 millionths. On Nov 18 it was more symmetrical and smaller at 490 millionths and was last seen on Nov 20 near the western limb. This group was seen with the (protected) naked eye on Nov 11, 12 and 13.

AR924 was first seen on Nov 13 at S8°/320° as a small Hsx spot but sported two satellite spots by Nov 15, type Cso, before decaying back to Hsx by Nov 20 when last seen.



Sunspot group AR923 on November 19 at 12:54 UT. *Dave Tyler*

AR925 was also first seen on Nov 13 S6°/305° type Hsx. By Nov 15 it was type Cao and faded on Nov 17, but recovered just before crossing the CM on Nov 18 only to disappear by Nov 20.

AR926 rounded the eastern limb on Nov 25 (return of AR921) at S8°/140°. By Nov 26 it had become elongated and by Nov 29 had developed into type Cao with an area of 130 millionths.

AR927, the first and only northern spot of the month, appeared on Nov 27 at N10°/128°. It was last seen on Nov 29 type Dao with an area of 90 millionths.

A transit of Mercury was observed from Australia by Monty Leventhal on November 8. Unfortunately cloudy conditions resulted in an observation lasting only 25 minutes through a break in the clouds. The planet was seen in the SW quadrant progressing towards the W limb.

H-alpha

Prominences

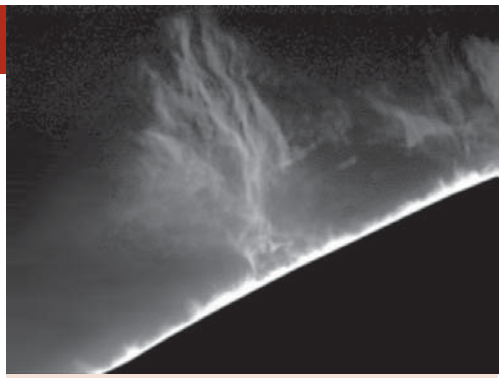
Nine observers reported a prominence MDF of 3.52 for November.

On Nov 1 a hedgerow type prominence was seen on the E limb at S05° to S16° and a further large prominence on the NW limb. A filament also persisted from October.

A well formed hedgerow type prominence was seen on Nov 6 on the SW limb extending from S27° to S43°. A pyramid type prominence was also evident on the NW limb extending to a height of 74,000km.

On Nov 9 and 10 prominence and filament activity was very active around AR923 and on Nov 18 a large prominence on the NW limb reached a height of approximately 130,000km. Another on the SE limb extended an arm to the S over 149,000km. Both were still evident on Nov 19 and the arm on the SE prominence had extended further to 214,000km.

Post flare loops were observed on Nov 20 emitting from region 923 as it rotated round the western limb. Another large prominence was observed on Nov 27 to the height of 140,000km on the SE limb.



Prominence activity on 2006 Nov 18, 11:33 UT. *Damian Peach*

Filaments and flares

Bright plages and filaments were seen to the E and S of AR921 on Nov 1 and two more to the far S near the E limb around S45° and another 10° S of the equator crossing the CM. On Nov 13 plages were seen to the SE of AR923 and three filaments surrounded it. A dark spot was observed on Nov 29, 9° E of AR926. No spot was vis-

North & south MDF of active areas g

	MDFNg	*MDFSg*
November	0.12	1.73 (33)
December	0.42	0.86 (31)

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

BAA sunspot data, 2006 November–December

	November		*December*	
Day	*g*	*R*	*g*	*R*
1	2	41	3	46
2	2	49	2	41
3	2	54	2	35
4	2	47	2	31
5	2	40	3	42
6	2	32	3	42
7	2	31	2	34
8	3	32	1	19
9	2	23	1	17
10	1	14	1	21
11	1	15	1	25
12	1	19	1	21
13	2	30	1	21
14	3	34	1	21
15	3	36	1	17
16	3	43	1	14
17	3	39	1	12
18	3	36	0	1
19	3	34	0	0
20	2	20	0	0
21	0	1	0	0
22	0	0	0	0
23	0	0	0	1
24	0	2	0	2
25	1	11	1	6
26	1	13	1	15
27	1	20	0	6
28	2	30	0	2
29	2	32	0	2
30	3	42	1	7
31			2	24
MDFg	1.71 (49)		1.05 (48)	

ible in white light. In H-alpha the 'spot' elongated into an obvious and dark filament; possibly a sudden surge.

A flare was in progress on Nov 5 at 12h 20m UT when Peter Meadows observed AR921. The follower part of the group displayed four bright areas which then became elongated but not quite as bright. The flare had almost faded by 12h 50m and had disappeared by 13h 15m.

A two part flare was seen by Brian Mitchell on Nov 12 at 09h 40m UT above the 'tail' spotlets following AR923.

2006 December

Solar activity in December was lower than November, returning to values similar to those recorded for the late summer and early autumn. The southern hemisphere was the most active but with lower activity than in November. Most observers recorded a blank disk on 10 days in December with all observers reporting Dec 19–22 inclusive as spotless.

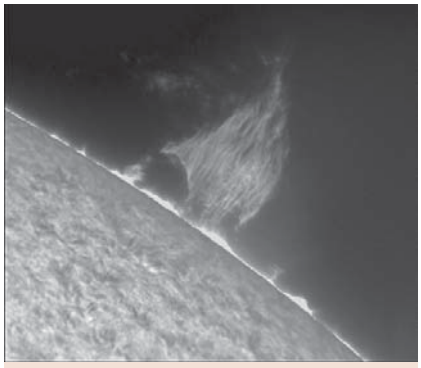
AR926 survived from November being recorded on Dec 3 as type Dsc with an area of 160 millionths at S8°/138°. By the following day the group had reduced its number of spots slightly and by Dec 6 was seen approaching the western limb type Bxo.

AR927 also survived from the preceding month, recorded as type Cso at N9°/129°. By Dec 4 this group had declined to a single penumbral spot type Hsx with an area of 70 millionths. This group did not change as it progressed towards the western limb in the following days.

AR928 appeared on Dec 1 as the first new group of the month, S8°/178° as an Axx spot. The group was short lived and was no longer visible by Dec 4.

AR929 made a brief appearance on Dec 5 as a Bxo group N2°/028°.

AR930 (return of AR923 last seen on November 20) appeared on the western limb on Dec 4, observed by Monty Leventhal from Australia at 21.30 hrs UT, accompanied by a flare and sub-flare. This group turned out to be highly active producing some of the strongest flares for some years (see H-alpha report below). The group was type Dko on Dec 6 & 7 at S5°/009° being a medium sized irregular penumbral spot accompanied by a number of small penumbral spots. Ken Medway reported seeing this group with the protected naked eye on Dec 7, 9, 10 & 12 and observing the group in CaK when it appeared to be surrounded by bright patches extending 30° east-west and 15° north-south. By Dec 9 the spot had become more symmetrical with an area around 440 millionths and the number of accompanying spots reduced. The spot lay on the CM on Dec 11 and had developed a second umbra by the next day. On Dec 16 the group was smaller type Hkx and was last seen on Dec 17 rounding the western limb accompanied by a post-flare loop.



Prominence activity on December 02. *Roel Schreurs.*

AR932 was another short lived group seen on Dec 25 & 26, S10°/144° type Bxi and Axx respectively.

AR933 and **AR934** appeared on Dec 30 at S4°/034° Hhx and N3°/32 Hsx respectively. Both groups had developed by the following day to Cki and Csi.

H-alpha

Prominences

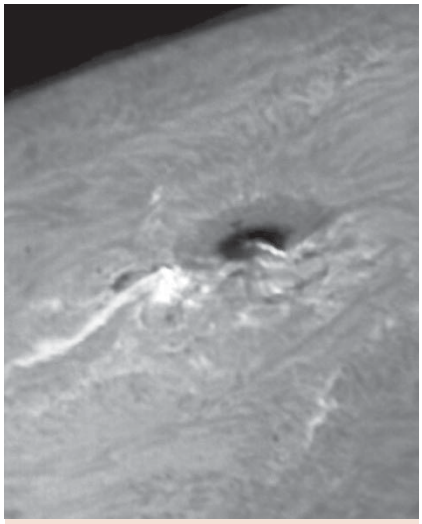
11 observers reported a prominence MDF of 4.39 for December.

Eric Strach reported that no outstanding prominences were observed by him during the month but many he did see were at high latitudes around 40° and higher. A large prominence complex was seen on Dec 9 in the NE quadrant at a height of 46,000 miles which by the following day had risen to 81,000 miles. Lee Macdonald reported two very large prominences on the SE limb on Dec 16, one of which was recorded by Monty Leventhal at 93,000km high. Ken Medway saw some 'spectacular prominences' the same day on the eastern limb comprising a system of two extensive arches seen either side of the equator. Peter Meadows reported the most striking prominence of the month on Dec 17 when a domed shaped prominence was seen on the SW limb at approximately S50°. On Dec 30 a prominence was recorded in the NW quadrant at approximately 93,000km high.

Filaments and flares

Few filaments were reported during the month. One was seen preceding AR926 on Dec 2 and another around AR930 on Dec 7. A curved filament was recorded on Dec 9 starting to the south of AR930 and veering to the west, running below a plage of similar shape. The most active period for filaments was Dec 25 & 26 when 5 and 6 filaments were seen on the disk.

AR930 produced a series of strong flares during its passage including an X9 flare on Dec 5, X6 flare on Dec 6, X3 flare on Dec 13 and an X1 flare on Dec 14. Finally it produced a C2 flare accompanied by a ring shaped prominence as it departed the western limb on Dec 17. Eric Strach reported a 2B flare from the group as it appeared on the eastern limb. This consisted of two brilliant red streaks covering the oblong and greatly foreshortened sunspot, so that only the most northerly portion of the spot was visible. As the flare faded it still overlay the spot but at the same time, some of the flare spilled over the eastern limb as a bright, small prominence. Eric Richardson reported a bright flare on the limb on Dec 22.



Flares on AR930, 2006 Dec 06, 09:51 UT. *Dave Tyler*

Lyn Smith, *Director*

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Saturn Section

A change of Director for the Saturn Section

In 2007 January, David Graham indicated that he was retiring as Saturn Section Director due to the increased pressure of domestic and professional commitments. I am very honoured to say that I have been asked to take over from David as the new Director. David has been Director of the Section for over 13 years, and on behalf of all BAA Saturn observers, I would like to thank him for the immense amount of hard work that he has put into the Section over this time.

Probably the most significant change over David's period as Director has been the increased use of digital imaging techniques to observe the planet, and their subsequent communication using the medium of electronic mail. Certainly Saturn is a popular target for all those interested in planetary imaging. As a result, the number of digital observations submitted to the Section has increased over the period of David's directorship, but the number of visual observations has sadly declined. It is hoped that digital imaging and visual observing will continue to complement each other, particularly during the period of the next ring plane crossing which is always an extremely interesting time for observers of the planet.

Although David has retired from the post, his immense knowledge of Saturn and his observing expertise will continue to be available to the Section. David has agreed to continue as an Assistant Director, supporting the Section and the generation of Section reports as much as he can.

For those who don't know me, I would like to introduce myself. I have always been interested in observing objects in the Solar System, particularly Jupiter and Saturn. I joined the BAA in 1969 (doesn't time fly?) and since that time have contributed observations to these Sections and occasionally to other Sections as well. I still continue to observe visually – which I enjoy – but like many observers I have also moved into observing with CCDs and webcams. For a number of years, I have been an Assistant Director of the Jupiter Section under the directorship of Dr John Rogers and so have supported the generation of the Jupiter apparition reports. In addition, I enjoy travelling to observe total eclipses of the Sun as often as I can.

I'm looking forward to taking on this new and challenging role in the Section, although I'm sure it will take me a little time to become fully familiar with all the associated responsibilities. Initially, it would be very useful if all current Section members or those interesting in joining the Section could contact me as soon as possible. This will enable me to get to know all the Section members who I have not met or corresponded with before. It will also ensure that the Section membership list is up to date and that members can be contacted as required with items such as newsletters etc.

Saturn is a fine object to observe with its rings and satellites and although the planet itself with its belts and zones has a similar appearance to Jupiter, it certainly is not as active. However short-term and seasonal changes do take place and spots occur from time to time. All of these effects can only be detected and followed by continuous monitoring of the planet. The co-operative monitoring of the planet by amateurs coupled with the analysis of observations and generation of apparition reports continues to be the primary role of the Section.

However another important role of the Section is to provide help, encouragement and advice to all who enjoy observing the planet, whether they are beginners or advanced observers. One of the ways the Section will provide this support will be via the Section Web page. It is hoped to progressively upgrade this over the next few months with various new items including an observer's guide. It is also hoped to include observations made by Section members during a given apparition.

Saturn imaged on 2005 April 5 by Mike Foulkes, using an Atik I HSII webcam and IR blocking filter on a 203mm SCT.

As I write this note, the planet is approaching opposition to the west of Regulus and so will be well placed for observing over the next few months. In addition, there is an occultation of Saturn by the Moon to look forward to during the early hours of March 2, which for some lucky UK observers will be a graze event. Hopefully the weather will be clear on this date and I look forward to receiving your reports both of the occultation and indeed all other observations of the planet made during current and future apparitions.

Mike Foulkes, *Director*

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Notice

The BAA Library and Archives

Dear Member,

On behalf of the BAA Council and Library Committee, I would like to draw your attention to some changes that are taking place concerning the BAA archives and library collection.

Thanks to many generous gifts and donations over the years, we have accumulated a substantial amount of astronomy-related and other material. Following recent changes at Burlington House, we are now in a position that we need to find a new home for much of this collection where appropriate. The Library Committee has been busy behind the scenes sorting through the material and they have now recommended to Council what should be retained and what should be disposed of: either by sale, by donation to our members, or by other means.

This is an ongoing exercise, so to keep members informed, we have established a Web page (**www.britastro.org/library**) where you can find latest information including lists of books etc. for sale, as well as periodicals and other items which we are prepared to donate to members on a first-come, first-served basis providing that items are collected from the Office at members' own expense.

The last occasion that the library collection was rationalised in this way was in 1980 and so it is well overdue that we repeat this process thereby bringing the collection up to date. If you are interested and wish to help in any way then do contact me directly. Those of you who do not have ready access to the Web may write to the Office for more information.

Richard Miles, *President*