



From the President

Meteor Section Director

I am pleased to let you know that at our April meeting, Council approved the appointment of Dr John Mason as Director of the Meteor Section. John took over running the Section in an acting capacity following the sad death of Neil Bone in 2009 April and has now confirmed he is willing to serve as Director for a period of three years. John is keen to encourage more active observers of meteor showers to help the Section maintain its excellent observing record.

During transfer of the Section records to John following Neil's death, the most up to date copy of the Section membership list was unfortunately lost, so if you (or your local society) have submitted observations to the Section within the past ten years, could you please send your contact details to John to make sure that he has you on his list – his e-mail address is docjohn@dircon.co.uk.

Another fine Winchester weekend

This year's Winchester weekend course at Sparsholt College was a great success with record attendance and one of the best programmes of talks in recent years. We heard about recent developments in professional astronomy and received practical advice on the latest observing techniques for amateurs. There will be a short feature about the event in a future issue of the *Journal*. The dates for 2012 are March 30 to April 1 so put these in your diary now.

Come to COAA

(Centre for Observational Astronomy in the Algarve), the well-known astronomy centre in Portugal. We provide dome-mounted 0.3m and 0.5m telescopes and we are close to the superb Algarve beaches.

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<http://www.coaa.co.uk>

The Robotic Telescope Project

Peter Meadows and Nick James gave a short talk at Winchester about the BAA's Robotic Telescope Project (RTP). This offers a 50% subsidy to members who wish to use the Sierra Stars Observatory Network (SSON) remotely operated telescopes in California and Arizona and provides advice and support to help you get the most from the system.

The RTP provides a unique opportunity for BAA members to make observations they could not achieve from the UK, either because they don't have suitable equipment of their own or because the target is not visible from the UK. The new project website at <http://www.britastro.org/robotscope/> contains examples of current projects and an application form. Peter's presentation at Winchester, which gives a good overview of the RTP, can be downloaded as a pdf file from the website.

As an example of how SSON can be used to obtain an observation impossible to make from the UK, Nick James requested images of the recurrent nova T Pyxis to be taken at SSON during the Winchester meeting. Notification had been received that T Pyx had just gone into outburst for the first time since 1966 and at declination -32° it is barely visible from the UK. (An attempt to see it visually by noted variable star observer Gary Poyner and others at Winchester was thwarted by low haze.) The false-colour image shown here, synthesised from the resulting SSON images in three photometric bands, V, Rc, and Ic, shows the nova at around magnitude $V=7.9$.

Your discount for recruiting a new BAA member

Remember that we have a special subscription discount available at the moment for introducing a new member to the Association. For each new member you introduce up to a maximum of 5, your own annual subscription at the next renewal will be reduced by 10%. (This applies to astronomical societies also!) With subscriptions coming up for renewal in August, now is the time to act to get a reduction on next year's sub. If



T Pyxis in outburst at about mag 7.9, imaged on 2011 April 17 using the SSON 0.61m Cassegrain telescope by Nick James (see text).

you enjoy your membership, it is likely that your astronomical friends who are not yet members will also do so, so take advantage of this offer while it is available. An application form was distributed with the April *Journal* and extra copies can be obtained from the BAA office.

Binders for your Journal collection

Council has approved the purchase of a supply of commercially made looseleaf binders which will each hold 12 copies of the *Journal*. The binders are red with 'Journal of the British Astronomical Association' and the BAA logo in gold on the spine, with labels for the relevant years. There is an image of the binder (though without the logo) on the BAA web page at <http://www.britastro.org/journal/images/jbaabinder.jpg>. You will be notified as to their availability and price (expected to be around £8.50 including postage and packing) by e-bulletin and by adverts in the *Journal*, so do look out for these.

Try out a Solar Stormwatch

This is another of the *Zooniverse* citizen science projects which I mentioned in a previous article. The motivation for this project is that the two *Stereo* spacecraft observing the Sun are sending back more data than the project scientific team can handle on their own. This data needs human interpretation, it cannot be done by computer, so the team want to engage the public in helping them recognise and track solar storms as they head towards the Earth. You can find out more about the project, and give it a try yourself, at <http://solarstormwatch.com/>.

David Boyd, President



'Back to Basics' in Macclesfield – a huge success!

A rather cool and blustery day did nothing to dampen the enthusiasm of the many people who attended the 'Back to Basics' workshop, jointly organised by the BAA and the Macclesfield Astronomical Society, held on 2011 March 5 at the splendid 19th century town hall in the centre of Macclesfield in Cheshire. It was apparent that the event would be well attended as the main lecture room was filling rapidly long before the official start time. Indeed some adjustments to the programme had to be made to better suit the much larger than expected gathering.

The opening session entitled 'So what astronomy can I do?' was presented by the chairman of Macclesfield AS, Mr Andrew Greenwood. Mr Greenwood gave a broad overview of what objects can be observed in the night sky, especially by beginners. BAA speaker Dr Stewart Moore then spoke on 'What equipment & books do I need?' Dr Moore certainly got it right during his talk covering the basics like planispheres and star charts, as the BAA Sales stand had difficulty keeping up with demand for these items later in the day.

Three BAA speakers covered how to observe the brighter objects in the sky – Dr David Arditti, talking on 'Observing Saturn & Jupiter', showed some nice images taken from his own light-polluted observatory in West London. Martin Morgan-Taylor covered Lunar observing using various techniques, and Solar observing was introduced by Lyn Smith who extolled the benefits of warm daytime observing much to the amusement of the audience.



Whilst the audience was being entertained the catering organisers were working their magic as the attendance exceeded all expectations and had now reached 130 people. During the lunch break the traders' room was well attended, as were the posters and displays by Macclesfield AS, who brought an array of telescopes ranging from a 16-inch Dobsonian to a 66mm refractor mounted on a simple photographic tripod.

After lunch the presentations were given as practical workshops. John McCue demonstrated his technique for observing and measuring double star separation by using two nice green apples drifting through a simulated eyepiece field on a flip chart, and a

little maths. The speaker enlisted the help of the audience to solve the simple equations and several smartphone owners were seen tapping away at their screens to provide John with the answers. The final session was led by Lyn Smith, demonstrating the more practical aspects of solar observing.

The feedback at the event was very positive on all aspects of the day including the enthusiasm and knowledge of the speakers and the overall organisation of the event. Subsequent e-mail feedback has reinforced the positive result for both the BAA and Macclesfield AS. Maybe your society would like to be involved in a BAA 'Back to Basics' event? – let us know!

Tony Morris

[tony.morris@btinternet.com]



The traders' room was busy. Photos by Andrew Greenwood, Macclesfield AS.



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Aurora Section

The turn of the year saw the start of a series of auroral displays between mid-February and early April which were seen from northern Scotland, those of mid-February and March being seen also from central Scotland and Northern Ireland. Solar activity seems to be very much in the ascendant and we are all now looking forward to more frequent and active displays next autumn and winter. Thanks to all who saw displays and passed on their reports and images. Observers are reminded of the importance of sending time and location information with their images – see the letter by Ron Livesey on page 170.

It's time now to think about the NLC season. The differences between 2009 and 2010 were quite significant and corresponded to increasing solar activity. The inverse correlation between solar cycle peaks and good years for NLC has been noted for some time and the drawn out solar minimum from about 2006 has allowed us to see clearly the effect of this on NLC frequency and brightness. It will be very interesting to see if there is any further reduction in NLC frequency in 2011. During 2006 to 2009 it was the exception to have nights between mid-June and late July when NLC was not seen. The data which demonstrated this were provided by a large



Auroral display on 2011 March 11/12 at 23:47UT imaged from Thurso, Caithness by Stewart Watt.

number of widespread dedicated observers which meant that, on most nights, it was clear somewhere and NLC observations could be made. Useful comparisons have also been made with the AIM satellite CIPS images provided by the University of Colorado.

I have often requested negative NLC sightings at the start and end of the NLC season as a way of trying to define when the season's displays begin and end. I would like to encourage observers also to extend reporting of negative sightings through the normal

time of maximum sightings in June and July, as it will be useful to know on which nights (in clear conditions) NLC was not observed. Comparisons can then be made with the CIPS images and with the mesosphere temperatures as supplied by the NASA *Aura* satellite through the University of Bath.

As always, your observations will be most welcome and I look forward to an interesting season.

Ken Kennedy, Director

UK Nova/Supernova Patrol

Observations of supernova 2011B in NGC 2655

Although the primary goal of the UK Nova/Supernova Patrol is to find new novae and supernovae, increasingly the odd behaviour of some of these objects after maximum light needs closer inspection. There have been several cases of novae initially fading and then undergoing a second or third maximum, the cause of which is still being researched. Supernovae can also behave in ways which seem to contradict initial findings from the

interpretation of their spectra. Supernovae of type Ia are particularly important in the interpretation of intergalactic distances so variation in their decline rates means amateur astronomers can extend photometry to quite faint levels to secure extended studies of their lightcurves.

Koichi Itagaki of Japan reported the discovery on CBET 2625 of a possible mag 15.8 supernova on an unfiltered CCD image taken on 2011 Jan 7.4 UT with a 0.30m reflector at Takanezawa, Tochigi. The new object was not detected on Itagaki's image of Jan 2.447 (limiting mag 18.5), but it does appear at mag 17.5 on his image of Jan 5.570, giving a valuable pre-discovery result.

The object is located at RA 08h 55m 48.50s, Dec +78 13' 02.7" (2000), which is 31.7"E and 21.4"S from the nucleus of the host galaxy, NGC 2655.

Itagaki's discovery image can be seen at <http://www.k-itagaki.jp/images/psn2655.jpg>. An independent discovery was made by Masaki Tsuboi on a 30-sec unfiltered CCD frame (limiting magnitude 17.5) taken on Jan 8.459 UT using a 0.30m reflector + CCD, which yielded mag 15.7.

Following an appeal by the Central Bureau

for Astronomical Telegrams (CBAT), Dave Balam, Dominion Astrophysical Observatory, Canada, *et. al.*, reported that a spectrogram of Jan 8.42 UT with the 1.82m Plaskett Telescope shows it to be a type-Ia supernova near maximum light. Cross-correlation with a library of supernova spectra using the 'Supernova Identification' code (Blondin & Tonry 2007, *Ap.J.* 666, 1024) indicates that 2011B is most similar to the type-Ia supernova 1992bo a few days before maximum light.

The coordinator obtained V photometry using the 0.61m Cassegrain of Sierra Stars, sponsored by the BAA Robotic Telescope Project (for which further details can be found at <http://www.britastro.org/robotscope/>). The initial results showed a significant brightening several weeks after discovery: 2011 Jan 26.60UT, 13.1V; Feb 1.34, 13.3V (see Figure 1). The subsequent lightcurve compiled by the coordinator from both patrol members' observations and other contributors (Figure 2) suggests maximum occurred on 2011 January 23 with V magnitude 12.8±0.1. The lightcurve now extends to 104 observations, in part due to the magnitude 11 galaxy in Camelopardalis being in a circumpolar area for most patrol members.



Figure 1. SN 2011B showing brightening after discovery to mag 13.3 on 2011 Feb 1. *Guy Hurst, Sierra Stars Observatory Network.*



Oddly, other efforts using the Bradford Robotic Telescope failed to produce results as the system does not appear to respond to targets very near the North Pole.

To date the decline is fairly linear though from early 2011 March the results with red filters seem to produce brighter magnitudes than in V. It seems this object may not be one which behaves oddly as mentioned in the introductory paragraph, though it remains worthwhile to continue monitoring it especially as it is so well placed. Charts with a sequence can be obtained from the AAVSO website <http://www.aavso.org/vsp/chart> or by contacting the coordinator.

If anyone wishes to join the patrol, whether to search for novae or supernovae, and/or to help extend the associated light-curves please contact the coordinator.

Guy M. Hurst, *Coordinator, UK Novae/Supernova Patrol*

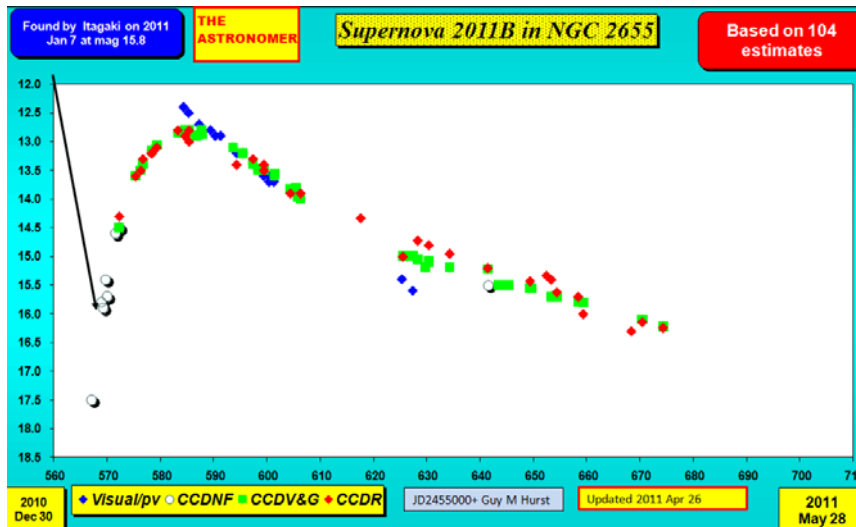


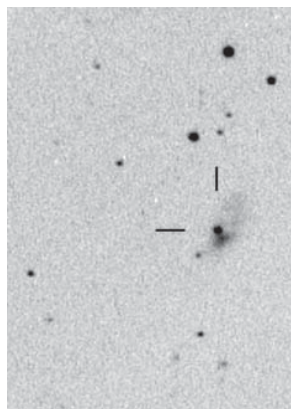
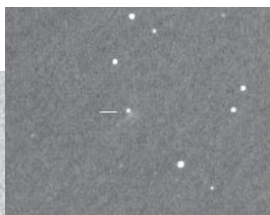
Figure 2. Lightcurve of SN 2011B.

Deep Sky Section

More supernova discoveries for BAA members

Long time BAA member and ex-President Maurice Gavin has found his first supernova. Maurice is an experienced imager of a whole range of astronomical objects, and observes from his home in Worcester Park, Surrey. He always checks his images for suspicious objects and this paid off on the night of 2011 March 18 when his image of IC 3862, a magnitude 14.5 galaxy in Canes Venatici, showed a 'new star' close to the centre of the galaxy. This has now been designated SN 2011az and shown to be a young type IIP supernova. An image of the supernova, taken by Nick James using a Celestron C11 and SBig ST9-XE combination, is shown below.

Maurice writes of his discovery: 'As an avid deep-sky imager using brief exposures, I regularly check galaxies on download for interlopers as



SN 2011az imaged by Nick James on 2011 March 23. Inset: Discovery image by Maurice Gavin, 2011 March 18.

part of my supernova patrol. The selection of faint IC 3862 was down to fate. I'd seen a WikiSky image and thought 'that's a challenge for light polluted suburbia under a full moon!'. Brief exposures showed mag 16/17 stars and IC 3862's core was a hazy spot with a faint star in virtual contact. It got me wondering, but I moved on to a few bright Messier objects before retiring.

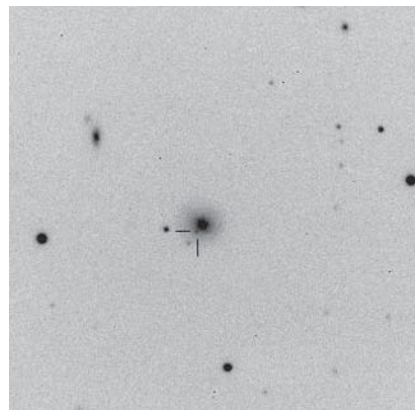
Next morning stacked images showed the 'star' was not an artefact. More images that night showed its position was constant (therefore not an asteroid), and it was absent from old internet images. Before midnight I e-mailed Guy Hurst (UK Supernova Patrol) and BAA supernova hunters Tom Boles and Ron Arbour. Next morning Martin

Mobberley made a confirmatory image via an automated telescope in New Mexico. That evening Ron Arbour, Nick James and Denis Buczynski obtained further images.

The apparent supernova was mag 16.2 at discovery on 2011 March 18 and rising.

Tom Boles measured my discovery images and submitted a claim on my behalf to the CBAT Transient Objects Confirmation Page as PSN J12535343+ 3605193.

I used my backyard observatory 30cm Meade LX200 SCT at f/3.7 plus Starlight Xpress Lodestar-C camera unfiltered. Given my severe light pollution (I'm nine miles from central London) my discovery gives hope to all interested in this pursuit – just add good technique, tenacity and a little luck.'



Discovery image of SN 2011bc by Ron Arbour, 2011 April 1.

Ron Arbour has made a further discovery, bringing his total supernovae to 25. His latest, in NGC 4076, a mag 13.5 galaxy in Coma Berenices, was found on 2011 April 1 at mag 17.3 using a 35cm SCT and SXV-H9 CCD. It was his first patrol with his new Paramount setup. Spectroscopy showed it to be a type Ia several days before maximum

Tom Boles' recent SN discoveries

SN	Date	Galaxy	Type
J07402601+5451127	2011 Feb 12	MCG+9-13-28	unknown
2011ap	2011 Feb 16	IC1277	IIn
J11165015+5443532	2011 Mar 23	MCG+9-19-24	unknown
2011bi	2011 Apr 04	MCG+7-35-37	IIP



Solar Section

2011 February

February's sunspot number was the highest recorded in the Section records since April 2006 ($R=40.69$). The northern hemisphere proved dominant but activity in both hemispheres was higher than in recent months. Observers recorded activity on all days of the month.

AR1150 S22°/182° remained on the disk from the previous month type Dso. By Feb 3 the group had decayed to type Bxo and was not seen thereafter.

AR1152 S19°/156° formed on the disk on Feb 3 type Axx. The group briefly grew to type Csi before decaying to two small open single spots type Bxo on Feb 5. No further reports of this group were received.

AR1153 N14°/173° formed on the disk near the W limb on the Feb 7 type Bxo. The group was type Cao the next day and had rounded the limb by Feb 10.

AR1154 N07°/151° was seen on Feb 8 only as a small single Axx spot.

AR1155 N17°/075° also made a brief appearance on Feb 8 type Cro.

AR1156 S20°/063° was first seen on Feb 8 as a small Axx spot. The group contained two small spots on Feb 10 still type Axx but was not seen on Feb 12.

AR1157 N20°/063° appeared on the disk on Feb 9 and grew to type Cso by Feb 12. The group continued to develop to type Dso on Feb 14 & 15 as it approached the western limb.

AR1158 S20°/034° formed on the disk and was seen on Feb 12 type Dsi with an area of approximately 60 millionths. The group developed rapidly achieving 430 millionths

▶ and it has been designated 2011bc. As Guy Hurst has pointed out, type Ia supernova 2007M also appeared in this galaxy. Ron's discovery image is shown above.

After Tom Boles discovered SN 2010js in November 2010 the appalling run of poor weather (snow and ice!) played havoc with his patrolling and it wasn't until Feb 12 that he made his next discovery. Since then he has made up for lost time and at the time of writing (mid-April) has made 3 further discoveries. Details are given in the table. The latest discovery on 2011 April 4 brings Tom's total to 142. Full information can be found on his website at <http://www.coddenhamobservatories.org>.

Stewart L. Moore, Director

by Feb 14 type Ekc. The group was near to the CM on this date and was seen with the protected naked eye. The group was of a similar size on Feb 16, consisting of three complex penumbral sunspots as well as smaller spots. The group declined to type Dkc on Feb 19 as it approached the western limb.

AR1159 N19°/034° was seen on Feb 12 type Hrx in the NE quadrant. The group briefly achieved type Cso before quickly declining and fading on the disk.

AR1161 N10°/330° appeared near the E limb on Feb 14. Two days later it had developed into a Dao group with an area of 210 millionths. The group continued to grow to type Ekc on Feb 21 and rounded the limb on Feb 24.



The active solar disk on 2011 Feb 17 at 12:23UT. A composite mosaic of 17 images by Pete Lawrence.

AR1162 N18°/336° developed on the disk north of AR1161 on Feb 19 type Dai. The two groups proceeded towards the W limb together with very little change.

AR1163 N18°/178° was seen on Feb 24 close to the NE limb. The next day the group had grown slightly to type Bxo with two spots. It declined to a single Axx spot on Feb 27 and returned to type Bxo on the following day.

AR1164 N28°/163° appeared on the NE limb on Feb 25 type Csi. The group grew to type Dao on Feb 26 & 27 containing three and six spots respectively. By Feb 28 the group had developed sixteen spots type Dac.

AR1165 S21°/184° appeared in the SE quadrant on Feb 26 as a single Axx type spot. The group remained on the disk unchanged to the end of the month.

6 observers reported a Quality no. $Q=6.18$.

H-alpha

Prominences

16 observers reported a prominence MDF of 3.93 for February. The first half of the month produced only small unremarkable prominences.

North & south MDF of active areas g

	MDFNg	MDFSg
February	1.46 (44)	0.93 (44)
March	2.17 (41)	1.24 (41)

g = active areas (AAs)

MDF = mean daily frequency

R = relative sunspot number

The no. of observers is given in brackets.

BAA sunspot data, 2011 February–March

Day	February		March	
	g	R	g	R
1	1	19	2	49
2	1	16	2	45
3	1	16	3	57
4	2	22	4	77
5	1	19	4	81
6	1	8	5	97
7	1	13	5	102
8	2	37	5	94
9	2	32	3	75
10	2	24	2	61
11	2	35	2	55
12	3	49	3	65
13	3	67	3	63
14	3	68	3	44
15	3	62	2	37
16	3	65	2	27
17	2	51	1	21
18	3	74	2	21
19	3	73	1	24
20	3	54	1	22
21	2	40	1	19
22	2	32	2	32
23	2	27	2	33
24	1	9	2	34
25	1	11	4	68
26	2	30	5	74
27	3	35	6	86
28	2	40	6	96
29			5	83
30			5	81
31			4	63

MDFg 2.07 (57) 3.17 (54)

Mean R 36.83 (49) 57.67 (46)



A bright but small prominence was seen on Feb 12 on the NE limb. A very active SE limb was observed on Feb 14 with five fir-tree type prominences. A spire also graced the NE limb.

On Feb 16 a prominence on the NW limb reached an approximate height of 84,000km.

Another large prominence reached a height of 74,000km on Feb 24, also on the NW limb. On the same day a bright hook type prominence was seen on the W limb, with a broad base. The hook curved over and almost reconnected with the limb in a southerly direction.

Filaments & plage

12 observers reported a filament MDF of 1.62 for February.

Bright plage was seen around the rear element of AR1150 on Feb 3 and also a dark filament over the E limb. A very short but thick filament was also observed midway between the disk centre and the W limb.

A short thick filament was reported near the NW limb and also an 'L' shaped filament near the NE limb on Feb 8.

On Feb 12 plage was seen around AR1158 which was also noted on Feb 14.

A long dark filament was seen in the SW quadrant on Feb 26 aligned north-south and a second was observed just over the E limb south of AR1164. Extensive plage was seen around and preceding AR1164.

The north-south filament of Feb 26 was still present the next day but fainter and now on the CM. A short dark filament was seen emanating from the rear of AR1164. Plage was seen in association with all three sunspot groups.

On Feb 28, bright plage was seen around

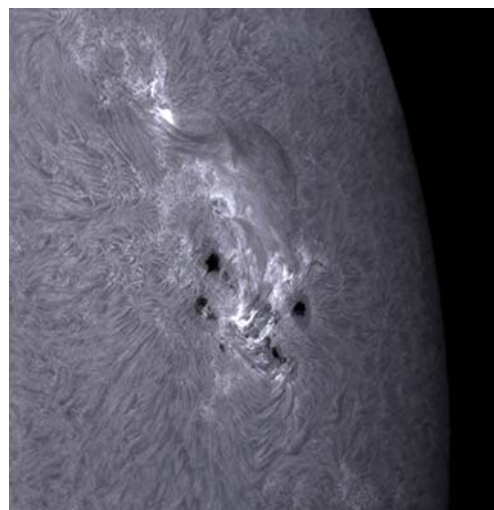
both elements of AR1164. The dark prominence in association with the group was still present.

CaK

All spot groups had associated CaK plage before, during and after they were visible. CaK activity is of two separate types, solid patches and larger areas of 'speckles'; both can be associated with sunspots.

A very large area of speckles was seen on Feb 3 extending as an oval from about 0°/190° to 35°/210°, growing from a smaller area nearly 10° square on Feb 2, centred at S20°/210°.

MDF for CaK plage for February 4.63 (1 observer).



Active area AR1164 imaged by Dave Tyler on 2011 March 7 at 09:47UT.

2011 March

March was the most active month of cycle 24 so far, returning a sunspot number of 57.67. The northern hemisphere was the most active but the southern hemisphere showed a marked upturn in activity giving its best showing since 2007 February. Observers recorded sunspot activity on all days of the month.

AR1164 N25°/163° remained on the disk from February. The group type Ekc neared the CM on Mar 2 with an area of 490 millionths, consisting of a main penumbral spot with two adjacent penumbral spots. By Mar 4 many more penumbral spots were seen within the middle portion of the group although its total area was almost the same. On Mar 9 with the group

approaching the western limb, 3 penumbral spots could still be seen.

AR1165 S20°/186° also remained on the disk from the previous month type Bxo containing 3 small sunspots. The group faded to a single Axx spot by Mar 4 but then surged back to an Eac type by Mar 7, consisting of six sunspots approaching the western limb. Only one of these penumbral spots remained visible the following day.

AR1166 N11°/091° was seen very close to the north east limb on Mar 2 and expanded to type Ekc by Mar 11 as it approached the CM with an area of 660 millionths. The group showed constant change to its appearance with many medium and smaller spots appearing and disappearing as the group progressed westward. The group was last seen on Mar 14.

AR1167 N09°/127° appeared on the disk on Mar 3 type Bxo. The group remained largely unchanged until it faded on the disk on Mar 9.

AR1168 N23°/215° made a brief appearance on the disk on Mar 4 & 5 type Hax.

AR1169 N20°/61° appeared over the eastern limb on Mar 6 initially type Dso before losing its following penumbral spots to become type Cai by Mar 11 and type Hkx on Mar 14 when its area was at a maximum of 340 millionths. The group was again Dso on Mar 16 and was last seen on the following day as it rounded the western limb.

AR1170 S26°/160° formed on the disk on Mar 8 near the western limb and was also seen on Mar 9 type Bxo before it rounded the limb.

AR1172 N12°/345° rounded the eastern limb on Mar 12 type Bxo. The group remained

The BAA archives – an appeal for original material

The conservation and cataloguing of the Association's archives is proceeding at a steady pace. Primary material is kept in the glazed cupboard in the office at Burlington House and is now catalogued. Duplicates are kept at the Bedford store together with Section material. Cataloguing of these items is progressing.

One of the more important items is the collection of members' original observing notebooks going back nearly 150 years. Some of these are in a fragile state and will require expert restoration. Equally significant is the fact that the collection is clearly incomplete. For example, we have volumes 1, 2, 5 and 6 of Elger's wonderful drawings. Where are volumes 3 and 4? It is to be hoped that missing material has not been permanently lost and would eventually form part of the BAA's hold-

ings. Members are asked to examine their collections and be prepared to pass over items which should properly be preserved in the Association's archives.

Through the valiant efforts of Sheridan Williams the digital scanning of past *Journals* is almost completed. This is, of course, where the future lies and it is anticipated that eventually all our archives will be so processed. The Royal Astronomical Society of Canada has very recently undertaken to examine and develop methods whereby, on an international basis, preservation of amateur records is realised. It is intended that the Association will be able to show that the preservation of its own records is fully in accordance with this aim.

R. H. Chambers, *Archivist*



unchanged until it faded on the disk. It was not seen on Mar 16.

AR1173 S29°/308° was a short lived Cso type group which formed on the disk on Mar 16. The group was seen on Mar 18 unchanged but was not seen thereafter.

AR1175 N13°/330° formed on the disk on Mar 19 type Cai. Over subsequent days the group developed to type Dao with a total area of 170 millionths before becoming type Cso on Mar 23 as it approached the western limb.

AR1176 S16°/198° appeared over the eastern limb on Mar 23 type Dao. It was at its largest the following day at 350 millionths still type Dao. By Mar 27/28 it was type Eac but smaller at 170 millionths and the number of sunspots within the group was seen to reduce. The group was still present on Mar 31 consisting of 4 spots extended in longitude.

AR1177 N21°/204° appeared near the eastern limb on Mar 24 as a single Axx spot. The next day it was type Cso before reducing to type Bxo on Mar 27 & 28. The group faded on the disk by Mar 30.

AR1178 S15°/173° was seen near the SE limb on Mar 25 type Cao. The group consisted of 11 sunspots by Mar 26 but had reduced to only 6 by the next day and 5 on Mar 28 type Dso. The group then faded on the disk as it approached the CM.

AR1179 N09°/274° appeared on the disk in the NW quadrant on Mar 25 type Bxi consisting of 6 small spots. The group then faded but reappeared on Mar 28 as it approached the western limb, consisting of 3 spots type Cso.

AR1180 N24°/163° was seen near the NE limb on Mar 25 type Hsx consisting of one penumbral spot. The group was still present unchanged at the end of the month.

AR1181 S15°/158° also appeared on Mar 25 but near the SE limb type Hsx. The group remained unchanged until Mar 30 when it reduced to type Axx and was not seen thereafter.

AR1183 N15°/140° appeared near the eastern limb on Mar 28 type Dsc consisting of nine sunspots. The group extended to type Eac as it progressed westward and was still on the disk on Mar 31.

6 observers reported a Quality no. Q= 9.66

H-alpha

Prominences

15 observers reported a prominence MDF of 3.58 for March.

The first half of the month did not produce any significant prominence outburst with the exception of a large detached promi-

nence seen on Mar 6 and a small but extremely bright active prominence on the SW limb on Mar 8.

As AR1169 approached the NW limb on Mar 16, large post flare loops were seen reaching a height of 102,000km. At 10:15UT on Mar 19, a large plasma sheet was seen extending over the W limb linked to the limb by a slender stem; the whole resembling a leaf lying on its side along the solar limb. By midday this prominence had erupted to a height of 250,000km and detached from the limb as a CME.

A broken arch prominence was also present on Mar 19 on the SE limb which subsequently became a long low arch on Mar 21 & 22. A single post flare loop reaching a height of 186,000km was seen on the SE limb on Mar 21. Also on that day, a large prominence hearth graced the NE limb consisting of two fans with interconnecting plasma and a sail shaped prominence to the south of them.

A filarom was seen on the NE limb on Mar 23 and a hedgerow prominence on the SW limb. A large diffuse prominence was also seen on the N limb.

6 prominences were seen on Mar 28 consisting of 2 bright pillars on the NW limb; a bright pillar on the SW limb and a long low hearth on the SW limb comprising a jet, a hedgerow and an arch.

Filaments & plage

12 observers reported a filament MDF of

1.86 for March.

Filaments were seen throughout the month. A long thin line aligned north-south was seen on Mar 10 from S20°/040° to S35°/040.

On Mar 23 a dark filament was seen extending eastward behind AR1176 and another preceding it. The next day, 2 dark filaments were seen curving southward from the rear element of AR1176. On Mar 25 a long dark filament was seen extending northward from the rear element of AR1176 and 2 more filaments that were in association with the group.

On Mar 28 dark curving filaments were seen in association with AR1176, AR1180 and AR1181. Another north-south aligned filament was seen in the NW quadrant near the western limb. A long dark filament extended southward from AR1180 on Mar 31 and another curving dark filament was seen on the CM in the southern hemisphere.

Plage was seen around several sunspot groups during the month including AR's 1164, 1165, 1166, 1176, 1178, 1181 and AR1183 (Mar 27 only).

CaK

CaK plage was seen in association with sunspot groups throughout the month but very extensive activity was seen between Mar 23 & 29 following AR1176 and also to the west of a small spot AR1180.

MDF for CaK plage for March 5.56 (1 observer).

Lyn Smith, Director

The Radio Astronomy Group in 2010

Solar cycle 24 has progressed since my last report,¹ with increasing activity. The chart in Figure 1 shows flares detected as Sudden Ionospheric Disturbances (SIDs) since 2005 May. The 22 SIDs recorded by the group in 2010 February is the largest number since

2005 September. The rest of 2010 saw a fairly steady SID count, although April and December were both blank. Most of the flares recorded as SIDs were C-class (66 in 2010) with 12 M-class. There were no X-class flares recorded in 2010.

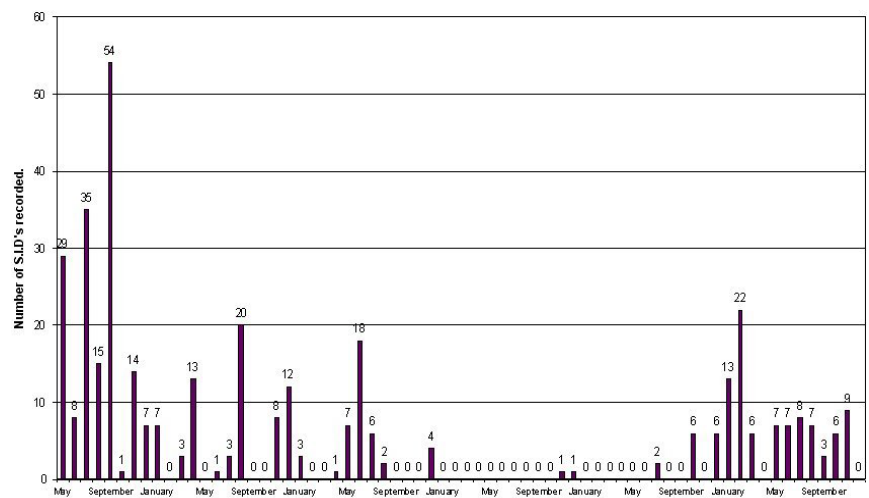


Figure 1. Number of SIDs recorded each month, 2005 May to 2010 December.

Figure 2 shows the relative sunspot number R as recorded by the Solar Section over the same period. The rapid increase of R in early 2010 is matched by increased SID numbers, although the continuing increase of R in the second half of the year does not have a similar SID increase. As with 2009, many sunspots during the second half of 2010 were of low complexity and did not show much flare activity. The smoothed curve is a 13 month weighted average, and is only valid over the first 6 months of 2010.

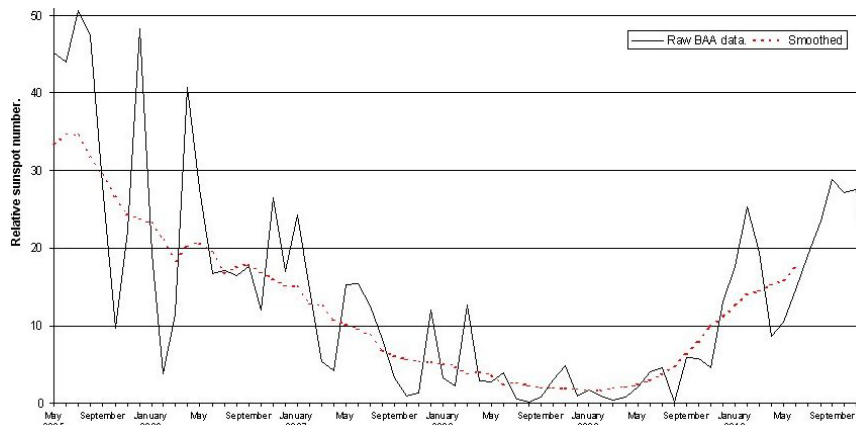


Figure 2. BAA Solar Section visual relative sunspot number 'R', 2005 May to 2010 Dec.

Figure 3 shows the busiest day of the year (2010 February 8), as recorded by Roberto Battaiola in Milan. He was monitoring a signal at 18.3kHz from central France. The characteristic shape of a SID is seen in the M1.1 and M2.0 flares with their sudden increase in signal strength followed by a slow recovery to normal. The M4.0 flare at 07:45UT is much smaller and less clearly shown as a SID due to its timing much closer to sunrise in the radio path from France to Italy.

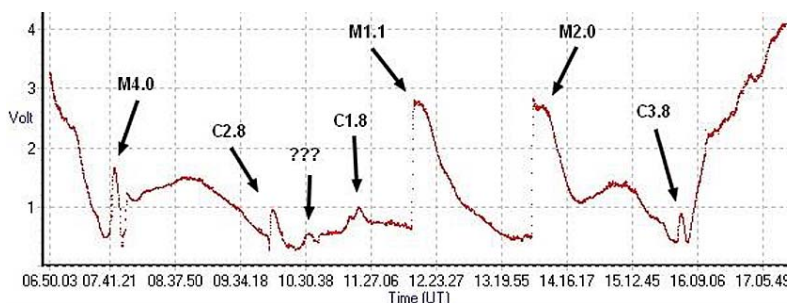


Figure 3. 2010 February 8. Chart by Roberto Battaiola.

Figure 4 shows a C8.8 flare recorded by Mark Edwards at several different frequencies on 2010 May 5. With a peak at 11:55UT, the chart covers about 3 hours. Mark calculates that this flare pushed the ionosphere D-layer downwards by about 4km.

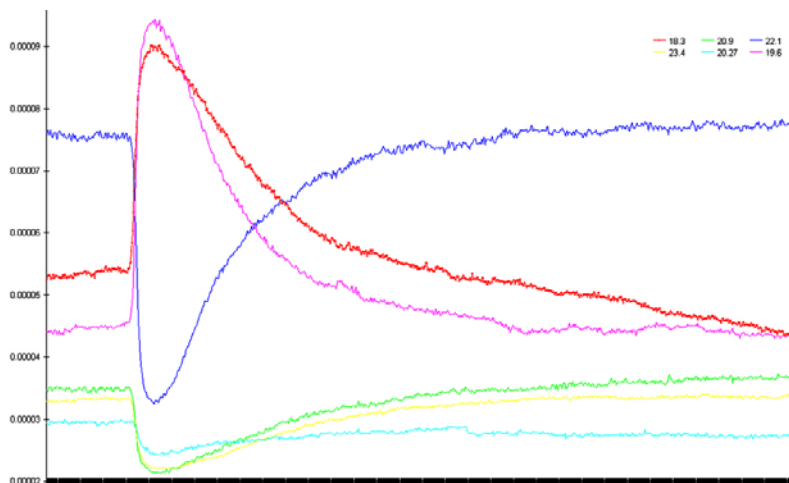


Figure 4. 2010 May 5. Chart by Mark Edwards.

2010 August 1 produced a very unusual SID from a multiple flare / coronal mass ejection / disappearing filament. It was well recorded by the group, and has already been reported in the *Journal*.²

November 5 produced a nice firework with an M1.0 flare, well recorded as a SID. My own chart (Figure 5) shows 23.4kHz in red and 22.6kHz in blue. Not all flares produce a rapid initial change in signal strength; this one took 20 minutes to reach its peak. The Space Weather Prediction Centre did not list it as a slow flare, but their satellite X-ray data gives a 46 minute rise to maximum. There was an M5.4 flare on Nov 6 peaking at 15:35UT. This was not so well recorded by observers being so close to sunset with a very low sun angle at this time of year.

December closed the year with no flares being recorded as SIDs.

Observers in 2010 were Roberto Battaiola, Colin Clements, John Cook, John Elliot, Mark Edwards, Gordon Fiander, Mark Horn, Paul Hyde, Martyn Kinder, Peter King, Mike King, Peter Meadows, Bob Middlefell and John Wardle.

John Cook [jacob@clara.co.uk]

¹ *J. Brit. Astron. Assoc.*, **120**(3), 132 (2010)
² *J. Brit. Astron. Assoc.*, **120**(5), 319 (2010)

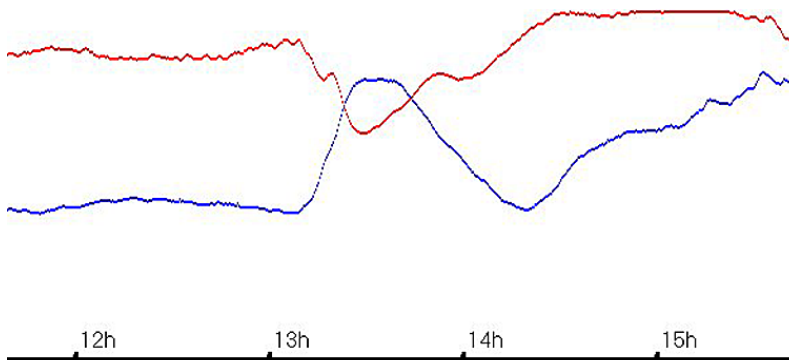


Figure 5. 2010 November 5. Chart by John Cook.