

# Report of the Council

for the session 2015 August 1 to 2016 July 31

To be presented to the members of the Association at the Annual General Meeting on 2016 October 26

The Trustees and Council of the British Astronomical Association present their annual Report and Accounts for the session ended 2016 July 31. For the financial year the surplus of income over expenditure was £5,057 (2015: £2,234).

**Jeremy Shears**, *President*  
**A. Lorrain**, *Treasurer*

## Officers and Trustees

The elected Officers and Trustees for the financial year ended 2016 June 30 are listed on page 310. Details of the members of Council may be found inside the back cover of each issue of the Association's *Journal*.

## Membership

	2014 July 31	2015 July 31	2016 July 31
<i>Subscription type</i>			
Ordinary	1452	1443	1367
Senior	878	936	963
Family partners	193	161	156
Young persons	48	43	36
Honorary	127	137	152
Life	<u>11</u>	<u>11</u>	<u>11</u>
<i>Members</i>	2709	2731	2685
<i>Affiliated Societies</i>	<u>45</u>	<u>47</u>	<u>44</u>
Total	2754	2778	2729

265 new members applied to join the Association during the session.

BAA membership outside the United Kingdom:

<i>Europe</i>			
Austria	4	Latvia	1
Belgium	6	Luxembourg	2
Cyprus	2	Malta	2
Czech Republic	1	Norway	4
Denmark	2	Poland	2
Finland	2	Portugal	4
France	19	Slovak Republic	1
Germany	18	Slovenia	1
Greece	2	Spain	11
Hungary	1	Sweden	8
Iceland	1	Switzerland	2
Ireland	19	The Netherlands	6
Italy	13	Turkey	1
<i>Rest of World</i>			
Australia	26	Oman	1
Canada	9	Russia	3
Chile	1	Saudi Arabia	2
Hong Kong	2	South Africa	5
India	4	Sri Lanka	1
Japan	6	Thailand	1
Malaysia	1	Uganda	1
Mexico	1	USA	112
New Zealand	7	Total non-UK:	318

The Council records with regret the deaths of the following members: Mr J. Armitage, Mr S. Armstrong, Mr D. Bagnall, Mr E. Benn, Rev. C. Blount, Mr P. Brack, Mr J. Brough, Ms I. Buchan, Mr R. Butterworth, Dr M. Charles, Mr P. Devadas, Mr A. Gander, Mr C. Gibbons, Mr D. Gosnell, Mr S. M. Groom, Mr R. Hall, Mr N. Heath,

Mr R. Hollick, Mr A. Lomas, Mr H. Miles, Mr R. Mordin, Mr A. Murray, Mr D. Porter, Dr P. Price, Mr C. Radley, Mr H. Rattray, Prof. E. Roemer, Mr S. Williams.

## Publications

The Director of the Computing Section, Steve Harvey, again provided content for and edited the *Handbook*, which is distributed to members with the current *Journal*. We remain indebted to those who both contribute material for publication, and also assist with proofreading the contributions of themselves and others.

Six issues of the *Journal* were published (a total of 396 pages), edited and typeset by the undersigned. Again I am pleased to acknowledge the highly efficient and professional efforts of our printers, the Magazine Printing Company of Enfield, Middx. Content included 28 refereed papers on a variety of topics, and scores of shorter articles and contributions of varying significance and complexity. All members are encouraged to contribute their material to the *Journal*, which could not exist without them – see the website [www.britastro.org/journal](http://www.britastro.org/journal) for notes on how to do so.

Few *Circulars* were published this year, primarily again because of a shortage of suitable observational targets. The notification function of the *Circulars* has been largely taken over by the 'e-bulletins', of which 58 were issued during the session, covering astronomical and Association news, observation notes, meeting reminders and other notices. Members not currently receiving the e-bulletins are urged to contact the office by e-mail [[office@britastro.org](mailto:office@britastro.org)] and ask to be added to the mailing list.

**Hazel McGee**, *Journal Editor*

## Meetings

2015–2016 has been another very good year with two meetings which were sold out before the deadline and the rest very well attended. All meetings had good feedback on the range of speakers and topics.

The session started with the autumn weekend 'Astronomy in Space' at the Rutherford Appleton Laboratory (RAL), near Didcot in Oxfordshire. The Sunday tour of the RAL site was very interesting.

Four of the Ordinary Meetings were in Burlington House with the Christmas Lecture, 'Gaia: the billion star surveyor' given by Prof Gerry Gilmore (Cambridge) at University College, London, with an audience of over 270. The George Alcock Memorial Lecture was given by John Toone to a packed lecture room at Burlington House on the topic of 'Systematic visual photometry of variable stars'.

The April Spring Meeting was in Chelmsford with the theme 'Robotic Exploration of the Solar System'. The two Back to Basics workshops were held in St Asaph, N. Wales (October) and Cheltenham (March); both were well attended and we had very good feedback from members of the audience on how helpful the workshops were, and that they were inspired to go out and put into practice what they had learned. The Observers' Workshop in Burlington House was on 'Comets and Meteors' which was also very successful.

Overall at the OMs in London we had 12 speakers, both guests and BAA members, and 5 Sky Notes speakers. As well as lecturers for the Ordinary Meetings, there were 4 speakers for the Observers' Workshop, 10 for the Back to Basics, 7 speakers for the Autumn Weekend Meeting and 7 for the Spring Meeting.

The conclusion of the session was the Summer Meeting, jointly organ-

## Report of the Council, 2015–2016

ised with Dr John Mason in York, when 5 speakers gave talks on ‘Cosmology Today: Probing the Dark Side of the Universe’. The Lord Mayor of York welcomed everyone attending to the city and a celebration cake was cut for afternoon tea.

In addition 2016 saw the 50th anniversary Winchester Weekend, again a huge success, organised by Ann Davies and Alan Dowdell.

Details of the meetings programme for the forthcoming session may be found on the Meetings Card which is enclosed with this *Journal*.

**Hazel Collett**, *Meetings Secretary*

## Sales & Promotions

During the past twelve months I have taken the BAA sales stand to thirteen events around the country. The 2015 Autumn Weekend meeting was held at the Rutherford Appleton Laboratory near Didcot, close to Newbury where I live so a shorter journey than usual. The Christmas Lecture at University College London was very successful with a good volume of sales. There were Section meetings at Rugby and Northampton, and this year Back to Basics returned to the popular venue of Shurdington near Cheltenham where I had the opportunity to make sales and promote membership to newcomers to the BAA. I visited Chelmsford for the first time for the one-day Spring Meeting and York for the BAA Summer Meeting. The BAA had sales stands at the International Astronomy Show at Stoneley Park near Warwick in October and, as usual, at Astrofest in London in February, both two-day events.

The membership promotion launched at Astrofest has again brought in new members. The BAA’s presence is always welcome at Astromet in Leeds in November where our *Handbook* is a popular sales item. The Webb Society and the Federation of Astronomical Societies again invited the BAA sales stand to their events, in Cambridge and Birmingham respectively. This year the BAA Winchester Weekend celebrated its 50th anniversary with its largest attendance for many years, good income from sales and some new members.

My aim is to recruit at least one new member at every meeting I attend. The opportunity to talk to people about the BAA and answer their questions often leads to their joining. Our free A5 leaflets about the BAA’s observing programmes are always popular. I have added new bought-in titles to the sales list for general interest, but I would still like to have new publications from BAA members. The current ones sell well, although in some cases would benefit from being updated. Sales have been good this year, helped by a much improved sales presence on the BAA website thanks to the efforts of webmaster Dominic Ford.

As always, I am very grateful for the help I get from members of Council and other BAA members who help on the stand, drive me to events or take sales items to other meetings that I am not able to attend. Maintaining a high profile for the BAA at as many events as possible around the country and throughout the year is important to ensure a steady flow of new members and to boost our income through sales.

**Ann Davies**, *Coordinator*

## The BAA Website

This March marked two years since the launch of the BAA’s new website, an anniversary which we celebrated by reviewing the online services we offer and setting new priorities for the coming year. To inform our review, we ran an online survey of BAA members and non-members in 2016 February.

We were delighted to receive responses from 899 individuals, including many lengthy comments. The feedback was overwhelmingly positive, but we identified several areas we can improve – including publishing more up-to-date content, more tutorials, and improving social interaction between members.

We have already begun work on addressing these issues. In July, we redesigned our front page and launched a new area for observing tutorials. This autumn, we will offer members a new facility to showcase their best observations on our website. And we will also speed up the publication

of videos of meetings.

Members can find out more about the Association’s online activities by following us on Twitter, @britastro, or visiting our homepage, <https://www.britastro.org/>.

**Dominic Ford**, *Website Manager*

## The BAA Archives

During the current session the remaining BAA *Memoirs* needed for the production of a CD set were scanned, and an introductory text written by RM. Final checking continues. Sheridan Williams is to be thanked for his sterling work on this nearly completed project.

RM has put together virtually complete unbound reserve sets of the *Journal* and *Memoirs*. We would like to acquire some better copies: see my Letter to the Editor in the 2016 June *Journal*. Norman McCouat kindly donated some *Journals* and a complete set of old *Handbooks* from 1922 to 1980. A long run of *Journals* came from Denis Buczynski. It remains our intention to archive all Section *Circulars* at Burlington House, and it was already possible to complete a bound collection of the old Lunar Section Circular, *The Moon* (1950–1966; volumes 1–15).

RM’s attention was drawn to the presence of notebooks by W. S. Franks (an early BAA Section Director) in a sale of the effects of the late Sir Patrick Moore at Christie’s in 2015 November. An intervention caused the items to be withdrawn from sale, and RM requested that they should be given to the BAA, as other Franks notebooks had been earlier in accordance with Sir Patrick’s known intentions. We await the final decision of the Trustees of the Estate. Denis Buczynski has passed on to us five double star notebooks (1913–’18) by Franks, given to him for the Deep Sky Section by Patrick in the 1980s, and Jeremy Shears has also provided three volumes of Franks’ notebooks given to him in 2013 by Richard Baum, having originally been received by him from Patrick in the 1950s. RM has been informed by Dr John Mason about the progress with scanning Patrick’s observational notebooks. By the end of the year all scanning should be completed, with the notebooks passed to the Science Museum for safekeeping.

This summer two fireproof storage cabinets are being acquired for the Office, thanks to a donation during the previous Session, and a reorganisation of archival material in London and Bedford will securely re-house the most valuable items. The missing T. G. Elger notebook (see last year’s report) has now been returned, was scanned and rebound. The Elger collection is thus reunited for the first time in years.

We acquired historical manuscript material from the collection of the late Gilbert Satterthwaite, and we thank his son Martin for this donation. Mr Satterthwaite’s library was acquired by the Society for the History of Astronomy. Mrs Sally Holborn, granddaughter of past President F. M. Holborn (1946–’48), has given us photographs of her famous ancestor as well as a few of his glass negatives of the Moon.

The Archivists will be pleased to hear of other potential donations. A list of archival materials has been kept, updating an earlier catalogue by RM (1981). Much work is needed to refine this before making it generally available. Meanwhile RM made use of historic documents to discuss the key role of women in the early BAA in the 2016 August issue of the RAS members’ journal *Astronomy & Geophysics*, celebrating the centenary of the election of female Fellows to the RAS.

Extracts from historical publications selected by JC have continued to appear in the *Journal*. The items selected for each issue are usually at twenty-five-year intervals. In October of last year, the BAA was 125 years old, thus items from at least five issues are now used for each piece. Each is written with some current astronomical event in mind. JC is a member of the newly formed ‘Website Operations group’, and archiving initiatives are being proposed within this group.

JC is presently engaged in digitally scanning and cataloguing many historical 3×3-inch glass slides, which long ago formed part of the Association’s ‘lantern slide’ collection. Many are original photographs taken by past members, some of which no longer exist in any other format. The collection was greatly reduced by former Librarian Leslie White in 1980, but the most important material was retained.

**Richard McKim & John Chuter**, *Archivists*

## Instruments Collection

For more than a century the loan collection has provided a valuable service for Members, but in recent times there has been little activity, due to the plethora of equipment now available commercially. Therefore, last year I proposed to Council that responsibility for the collection be transferred to the Instruments and Imaging Section. Council accepted this proposal, and in October the post of Curator of Instruments was dissolved. Further details are included in the report of the Instruments and Imaging Section on p. 307.

**R.A. Marriott**, *Curator of Instruments, 1991–2015*

## Commission for Dark Skies

In the last twelve months the CfDS has been busier than ever before, and our aims and priorities reflect the massive changes in lighting that are currently occurring (see [www.britastro.org/dark-skies/cfds\\_about.php?topic=aims](http://www.britastro.org/dark-skies/cfds_about.php?topic=aims)). We continue our dialogue with central and local government, the lighting industry, environmental organisations, National Parks and Areas of Outstanding Natural Beauty. The marked increase in LED lighting in the UK, not all of it environmentally friendly, and the likelihood of an upsurge in fracking have given us new avenues to tread.

The CfDS continues to try to influence local authorities and the lighting industry, recommending they concentrate on LEDs which do not emit excessively blue-rich light (of colour temperature 3000K and more), in order to avoid negative effects upon both humans and wildlife. In 2016 July, Howard Lawrence was our representative at the Institution of Lighting Professionals' national summit in Brighton. Key themes were adaptive lighting (switch-offs, which the CfDS supports if no negative conse-

quences occur), the evolution of LEDs and SMART cities, with remotely controlled and 'intelligent' lighting. Light pollution was low on the agenda. As a result of contacts made there, we have further openings to increase CfDS influence among lighting professionals.

The CfDS has been represented at many national and international events. Commission members attended the International Artificial Light at Night (ALAN) conference in Québec in 2015, and will be in Cluj, Romania this year at the next world light pollution congress. Our redesigned CfDS display panels have been admired at BAA events, Astrofest, the International Astronomy Show, the Equinox Skycamp, the South West Astronomy Fair and many other venues.

Our annual Joy Griffiths Award for meritorious work in the pursuit of darker skies went in 2016 April to lighting consultant Jim Paterson, who has promoted 'star-quality' lighting as part of the UK's growing number of IDA dark-sky areas for many years, most recently in the Brecon Beacons National Park. Jim also advised the island of St Helena earlier this year on non-polluting airport lighting. In 2016 May, the South Downs National Park became the world's newest International Dark-Sky Reserve. Wales now has more of its land area (18%) under protected night skies than any other country in the world.

The redesign of the Commission's website by Steve Tonkin and Howard Lawrence is now complete, and new leaflets and other literature are available. A great deal of work has recently gone into a CfDS poll of amateur astronomers at meetings and events in many places, in order to gauge opinions on current trends in lighting, and in particular how the LED revolution is affecting night skies. Early analysis of the data suggests that LEDs may not be quite the threat that has been anticipated, and more will be published on this at a later date.

We were pleased to welcome Carolyn Bedwell (Leicester) to the CfDS committee in May.

**Bob Mizon**, *Coordinator*

## Sections

### Solar Section

The downward trend in sunspot activity continued during the latter part of 2015 and into 2016, with a dramatic fall recorded in 2016 June. Both hemispheres contributed equally to this decline and the first run of spotless days occurred at the beginning of June followed by a longer run of spotless days at the end of the month.

2015 August and September produced three southern hemisphere sunspot groups that were all visible to the protected naked eye: AR2396, AR2403 and AR2422. AR2403 and AR2422 both comprised separate



An eruptive prominence imaged in H-alpha by Dave Tyler at 09:36UT on 2015 September 17.

elements that were both seen by the protected naked eye for several days.

2015 September also delivered a spectacular H-alpha event in the form initially of a large prominence hearth on the SE limb (see image below). The feature then rotated onto the disk and traversed the solar disk as a distinctive north/south aligned filament estimated at around 240,000km in length and 35,000km in width. On arriving at the SW limb, the filament rotated onto the limb on Sept 29 and became an active prominence that erupted on both Sept 29 & 30.

A total eclipse of the Sun occurred on 2016 March 9, visible from Indonesia. Several reports were received by the Section from observers who had travelled to Tidore and Ternate in northern Sulawesi.

A further large sunspot group, AR2529, was observed during 2016 April, again visible to the protected naked eye between April 9 and 17. This was a northern sunspot group and unusual in that a very rare event, a white light flare, was recorded from this Active Region by the Astronomical Society of Victoria, Australia, on 2016 April 18 at 10:30 a.m. local time.

A transit of the planet Mercury occurred on 2016 May 9 and was extensively reported and imaged by Section members.

During the report period, a further feature was added to the Section's programme of work. Kevin Kilburn has been recording chromospheric 'bruising', a term describing the monochrome photographic appearance of bipolar magnetic regions in H-alpha. These BMRs are areas of fibrils sometimes seen as dusky areas within the chromosphere, and are the underlying cause of all photospheric and chromospheric activity.

The Director has given talks at the BAA Back to Basics Meeting, St Asaph, North Wales and to Cockermouth Astronomical Society as well as to local adventure scout groups in the Angus area.

The Section is an active observing Section with over 50 regular contributors reporting on white light and H-alpha solar activity and a further 20 regular solar imagers submitting several hundred high quality images per month. During the report period, four new members have joined the Section and two have resigned. Most recipients of the Section's monthly newsletter receive the publication via e-mail, with 218 copies currently

being circulated. A further 11 printed copies are circulated by post.

**Lyn Smith, Director**

## Lunar Section

Membership of the Section continues at a healthy level, with 177 copies of the monthly *Lunar Section Circular* sent out as PDF attachments to those on the e-mailing list. The Section also continues to receive and publish a good number of observations, both visual and images, although the number of active observers remains small relative to the size of the mailing list. This is a source of some concern and new observers and imagers are always welcome. Anyone interested in joining the Section is invited to contact the Director for advice and help.

The Section's observational results are communicated primarily through the monthly *Circular*. Editorship of the *Circular* has now been assumed by the Director, and during the year under review twelve issues, each running to between thirty and forty pages in length, have been distributed to members throughout the world.

As in previous years, the Section runs an established programme of observations that offers opportunities to both visual observers and imagers. Increasingly, however, members are making use of data returned from spacecraft missions to supplement their own observational work, and this is to be welcomed. In the past the Section has enjoyed links with Raffaello Lena and the Geological Research Group in Italy. With the cessation of that group, Raffaello has accepted an invitation to join the Lunar Section Committee as coordinator of a programme dedicated to the study of lunar domes. We welcome him and his unmatched expertise in that area, and we wish the programme all success, particularly as the BAA Lunar Section helped to pioneer the observation of lunar domes during the 1950s and 1960s.

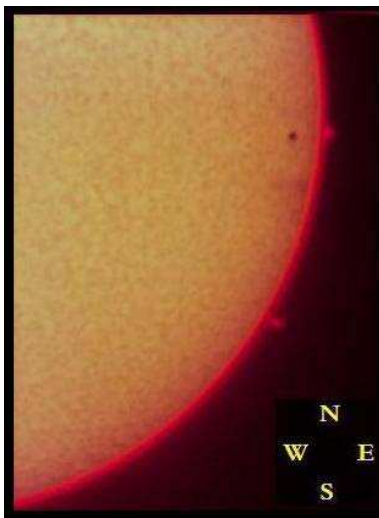
To help raise the profile of the Section, the Director has spoken at meetings of various local astronomical societies during the year, as well as giving a presentation on lunar observation at the Association's 'Back To Basics' meeting in Cheltenham on 2016 March 5.

The total lunar eclipse of 2015 September 28 was well observed throughout the UK and a brief report appeared in the 2015 December *Journal*. 2015 also saw the tenth anniversary of the passing of Harold Hill, and the October *Journal* carried an appreciation of the achievements of that great lunar observer, written by Richard Baum and the Director.

As ever, the Director is grateful to the Section officers and committee members for their ongoing work and support.

*As this report went to press we heard the sad news of the sudden death of Peter Grego, Assistant Section Director. Peter's loss is a grievous blow to the Lunar Section and his contribution will be properly marked elsewhere in due course.*

**Bill Leatherbarrow, Director**



The transit of Mercury, 2016 May 9, at 11:30UT, imaged by R. J. McKim with an H-alpha filter (60mm OG).

## Mercury & Venus Section

Mercury attracted considerable interest at its transit on 2016 May 9. This event was widely publicised through BAA and Section websites, and by the undersigned in the February and April *Journals*. Many UK observers (particularly those in central or northern UK) enjoyed good views. P. W. Abel & P. R. Lawrence, G.-L. Adamoli, R. M. Baum, G. Di Giovanni, C. Fattinanzi, C. Foster, M. Foulkes, M. Giuntoli, R. Hartness, A. W. Heath, R. Hill, N. D. James, R. W. Johnson, M. Kardasis, S.

L. Karl (via L. Smith), W. J. Leatherbarrow, P. Macdonald, P. Meadows, F. J. Melillo, M. P. Mobberley, P. Mulligan, D. Niechoy, P. W. Parish & T. Cannon, I. S. Phelps, A. Tough, D. B. V. Tyler, A. Vandebergh, A. G. Vargas, T. Wakefield (via L. Smith), S. Williams and the Director sent reports. Some observers made accurate timings of the contacts. The Editor published some images on the covers of the June *Journal*.

On May 9 the Sun showed only a few small sunspot groups, small limb prominences, plages and a few flocculi. In crossing the disk the planet did not pass close to any sunspot, but it was adjacent to two limb prominences at ingress, which added interest for those (including the writer) who were able to watch in hydrogen alpha (Figure 1). The duration of the transit was also marginally longer in H-alpha owing to the additional thickness of the chromosphere. The bright aureole which had been seen around the planet in white light at past transits was conspicuous by its near-absence to most observers: this feature is an effect of inadequate resolution. It can be produced by over-sharpening images, and becomes increasingly obvious the smaller the aperture. With a 254mm aperture, the Director could not see it at all. Likewise there was little evidence of the 'black drop' effect either visually or in the images, but some images do show it when seeing was poor. Like the aureole, it is an effect of inadequate resolution rather than bad seeing, but it is exaggerated by turbulence.

In the morning or evening sky, Mercury was less often observed, but Chris Hooker in 2016 July obtained several excellent near-infrared images. Other contributors were Gianluigi Adamoli, Chris Dole, Massimo Giuntoli and Frank Melillo.

Venus was poorly placed for much of the Session, having passed through inferior conjunction and into the morning sky on 2015 Aug 15, reaching greatest elongation West on Oct 26 and superior conjunction on 2016 Jun 6. There is no special point to draw attention to, but we thank 34 contributors for their comprehensive data from the 2015 eastern elongation and 18 for the 2015 western elongation. We again appeal for visual observers to join us.

Meanwhile, the writer has been working on the next eight-year (ten elongations) Venus report. Paul Abel has helped by analysing the visual phase anomaly data for the period. The Director has recently been in correspondence with Prof Fred Taylor concerning his latest views about the Ashen Light. There is much more still to be done to produce a full analysis of the 2007–2014 period.

Finally we congratulate former Section Secretary and current Committee member Prof Bill Leatherbarrow in having recently had a minor planet named after him.

**Richard McKim, Director**

## Mars Section

The 2016 apparition has been enthusiastically monitored by a team of 67 observers, although the planet was not at all well-placed for observers in the UK at opposition on May 22. With Mars still at its best in June, the unseasonably cold and wet weather did not help matters, but July was somewhat better. Some UK observers found the planet obscured by houses or trees, but the Director was favoured with steady seeing on a number of evenings. By way of compensation we received many excellent results from Australia, South Africa and North and South America. Two Interim Reports in the *Journal* have discussed various aspects of the observations. It is interesting to compare recent data with seasonally similar records from 1999 and 2001, but the extraordinary increase in resolution since the early 2000s now enables certain seasonal phenomena – such as the dissipation of the Equatorial Cloud Band and the formation of the North Polar Hood – to be followed in much finer detail.

Certain features continue to puzzle the telescopic observer, such as a light yellowish streak at the western edge of *Elysium*, brightest in red light, which had been present during recent apparitions. So strikingly bright did this become in the days around opposition that it seemed best to issue a precautionary dust storm alert in BAA e-Bulletin No. 918 on May 28. But subsequently the streak returned to its usual appearance without developing, and so must be dust settled upon the surface – but surely in an unusual situation. A talk about the opposition will be given at the 2017 March Ordinary Meeting.

A considerable amount of my time has been needed for urgent BAA archival matters this Session, and with deskwork for other Sections, but with the successful completion of most of this I now hope to focus once more upon the completion of historical Mars apparition reports. More deskwork was recently done and the 2010 Mars report was completed, apart from final checking. During the year the Director was in touch with some professional astronomers, including Dr Jim Shirley on the matter of predicting great dust storms.

During the Session we were sorry to learn of the death of P. Devadas of Madras, India, who had been a member of the Section in the 1960s, and from the 1990s until 2003. An obituary appeared in the 2016 August *Journal*. Some of the historical Mars observations by A. A. C. Eliot Merlin will appear in a biographical paper recently accepted for publication, and the Director will give a summary of Merlin's life and work at the 2017 May Ordinary Meeting.

**Richard McKim**, *Director*

## Asteroids & Remote Planets Section

Firstly, as Director, I regret that time available for Section activities has been severely limited during the year, in large measure due to my need to progress a series of three scientific papers on the subject of cometary outbursts, which were submitted to the professional planetary science journal *Icarus* in early August, *i.e.* at the very start of the 2015–2016 session. Having subsequently to respond to the comments from each of six reviewers and revise the original drafts has taken up most of my available time, with all three papers having been finally accepted in February of this year. The papers in question occupy the final 87 pages of the 2016 July 1 issue (Vol. 272) of *Icarus*.

Observation-wise, the year has been relatively quiet with no Near-Earth Object visible brighter than 14th magnitude apart from (33342) 1998 WT24, which made another return to the vicinity of the Earth attaining 11th magnitude in mid-December. Coverage of this NEO was limited, it having been well observed in 2001.

The most unusual object this session seems to have been WT1190F, found on 2015 October 3 by the Catalina Sky Survey, which impacted the Earth on November 13. Both Nick James and Peter Birtwhistle were able to image the body a day or so before impact, with Peter managing to follow it the next day down to within 20 minutes of its hitting the Earth's atmosphere, when it was at a range of just 9400km from his observatory. Peter was the first to point out that the object appeared to be artificial in that he was able to link it to 9U01FF6, a piece of space debris now thought to have been the trans-lunar injection stage of the 1998 *Lunar Prospector* mission. WT1190F was only the third NEO to have been discovered prior to Earth impact.

Four asteroidal occultation predictions (bright with long duration) were highlighted in the 2015 *BAA Handbook*. In a repeat of the previous session, six occultations were successfully recorded. A total of 75 individual occultation observing runs was undertaken from the UK, and the observations have been posted on the [www.euraster.net](http://www.euraster.net) website. Positive timing observations were achieved for the following objects:

<i>Asteroid</i>	<i>Date</i>	<i>Observer(s)</i>
(583) Klothilde	2016-May-23	Tim Haymes
(344) Desiderata	2016-Feb-18	Alex Pratt
(423) Diotima	2016-Feb-16	Tim Haymes, John Talbot
(373) Melusina	2016-Jan-12	John Talbot
(589) Croatia	2015-Dec-20	Peter Birtwhistle, Philip Denyer, Tim Haymes, Nick James, Malcolm Jennings
(275) Sapiientia	2015-Sep-30	David Arditti, David Briggs, Len Brundle, Peter Carson, Marc Charron, Sean Clarke, Philip Denyer, Tim Haymes, Chris Hills, Chris Hooker, Steve Hubbard, Malcolm Jennings, Adrian Jones, Trevor Law, Simon Kidd

Two e-bulletins were issued ahead of the (275) Sapiientia occultation of the 7th magnitude star HIP14977 on September 30, which proved to be by far the most successful event observed from the UK. A report appeared in the 2015 December *Journal* (125(6) 331–332). Tim Haymes has continued to

issue details of forthcoming asteroid occultations via the *Asteroids and Lunar Occultations UK* Yahoo group, which he oversees. John Talbot also produces predictions for a large number of small-diameter bodies (<http://ukoccultations.info/UKOCL>), a web feed from which is accessible via the freely available *OccultWatcher* program maintained by Hristo Pavlov.

Eric Watkins received his MPC Observatory Code (K01, Astrognosis Observatory, Bradwell) in March, as has Peter Carson (K02, Eastwood Observatory, Leigh on Sea) which means we now have 35 Section members with their own observatories officially registered. Kevin Hills has continued to contribute results to the *Minor Planet Bulletin* (43(1), 5–6 (2016)) with a paper under the heading, 'Asteroid lightcurve analysis at Riverland Dingo Observatory (RDO)' comprising rotational lightcurves for the asteroids (1794) Finsen, (2476) Andersen, (3296) Bosque Alegre and (8159) Fukuoka.

Tim Haymes and the Director contributed 19 pages of asteroid-related information for the 2016 *Handbook*. An Observers' Workshop has been organised for September 24 at Burlington House and this will be preceded by the European Symposium on Occultation Projects [ESOP 35] on August 19–21 at the University of Surrey (Guildford). The Local Organising Committee for this four-day symposium comprises Tim Haymes (Chair), Alex Pratt, Adrian Jones and the Director. A significant effort has gone into organising ESOP35 and both the BAA and RAS have made grants available to support the activity.

**Richard Miles**, *Director*

## Jupiter Section

Observations of Jupiter continued at a high level in the 2015/'16 apparition, leading up to the *Juno* orbiter mission, which began on 2016 July 5 with the insertion of the NASA spacecraft into jovian orbit.

As is now the norm, thousands of images of the planet were available from observers all around the world, including many images of high resolution. The quality is still improving as enhanced cameras are brought to market. The ZWO ASI1120 series, which most observers adopted only 2–3 years ago, was superseded by the ASI174, and now a few observers are 'test-driving' the ASI290 with even better results. Special mention is due to Christopher Go in the Philippines and Tiziano Olivetti in Thailand, who have both produced remarkably consistent series of very-hi-res images throughout the apparition, and to Phil Miles in Australia, who has been getting remarkable results with a new 20-inch telescope, in collaboration with experienced observer Anthony Wesley. Miles acquired a particularly narrow methane-band filter, and thus achieved especially valuable methane-band images.

In the 2014/'15 apparition, we received images from 73 observers: 14 in the UK, 19 in the USA, and 40 spread across 19 other countries. Of these observers, 44 contributed substantial numbers of images directly to the Section; 17 were only occasional contributors, and 12 were among those who posted via the ALPO or ALPO-Japan. Additional observers in Italy and France sent images directly to the JUPOS team for analysis. Image analysis was done as usual by the JUPOS team; in 2014/'15 they made 64,059 measurements of atmospheric features. Visual observations were received from three members in the UK, one in Italy, and one in Japan.

As the planet will be south of the equator for the next 6 years, images from the southern hemisphere will be increasingly important. In addition to the existing contributors in Australia, we now have an observer in South Africa – Clyde Foster, who visited the BAA in London in January – and several excellent observers in Brazil have become known through Facebook.

Opposition was on 2016 March 8. Activity on the planet developed more or less in line with predictions we made a year earlier, although more slowly than expected. Thus a sector of the NEB expanded northwards (although this event has subsequently regressed); normal activity continued in the SEB (at least up to May); oval BA decelerated; and a North Temperate Disturbance continued to dominate that domain. Both the NTB and STB are now largely absent, so attention should be maintained on those domains. A synopsis of activity on the planet was published in the *Journal* for 2016 August.

A fireball was detected in Jupiter's atmosphere on 2016 March 17, by an observer in Austria and another in Ireland. This was the first



observed since 2012, but the fourth since the start of 2010, suggesting that the actual frequency is at least one per year. Observers are urged to run their raw videos through Marc Delcroix's DeTeCt program to search for such impacts.

We continue to post interim reports on the Section's web pages, on average about once a month; they are notified to Section members by e-mail. (Among those in 2015/16 were reports on the methane-dark waves on the NEB, and animations of the rotation of the Great Red Spot.) A final report on the 2014/15 apparition was also posted on our website; as usual, this was a collaboration with Gianluigi Adamoli and the rest of the JUPOS team, and thoroughly covered the measured aspects of the planet's activity, although some descriptive aspects have not yet been included. A final report on the 2015/16 apparition is in preparation, for reference during the *Juno* mission.

Having taken early retirement from his career, the Director is now largely 'employed' in Jupiter studies and has thus made progress on more definitive reports. Two long-term reports have been posted: 'Relationship of NEB rifts to NEB expansion events', and 'Jupiter's South Temperate domain: Evolution 1991–1999 and dynamics of cyclonic structured sectors as seen in Hubble maps'. Our discovery of previously unknown and exceptionally regular wave-trains on the SEBs jetstream led to collaboration with Dr Leigh Fletcher and a professional publication in *Icarus*: 'A dispersive wave pattern on Jupiter's fastest retrograde jet at 20°S'. Our detailed accounts of the SEB Fade and Revival in 2010, previously presented in a series of reports online, have now been concentrated into two papers accepted for our own *Journal*. Similar papers on the NEB Fade and Revival in 2012 are in preparation.

The Section now has two websites. The older one, at: <http://www.britastro.org/jupiter>, still contains all our material including 'Observing guides', 'Reference articles' and 'Reports' up to 2015. It will remain active, but is now supplemented by a newer site (set up by Dominic Ford) at: [https://www.britastro.org/section\\_front/15](https://www.britastro.org/section_front/15), which contains newer items, especially our reports on the 2015/16 apparition, and recent publications. We also have a 'BAA Jupiter Section' page on Facebook.

Section officers participated in various BAA and 'pro-am' meetings during the session. Presentations on observing the planets were given at two BAA 'Back to Basics' meetings; by Mike Foulkes at St Asaph (North Wales) on 2015 Oct 10, and by the Director at Shurdington (Gloucs.) on 2016 March 5. The Director gave talks at four conferences:

- European Planetary Science Congress (Nantes, France) in 2015 September (plus a poster in the professional 'Giant planets' session). The talks in the session 'Amateur contribution to planetary science' have been posted online and can be accessed through our new website;
- Joint meeting of the Royal Astronomical Society and Royal Meteorological Society, 'Weather on other planets', at Burlington House, London, 2015 Oct 9;
- EuroPlanet Workshop on '*Juno* Ground-based Support from Amateurs' held in Nice, France, on 2016 May 12–13 (reported in the 2016 August *Journal*);
- JUPOS team meeting in the Black Forest, Germany, in 2016 July.

The 2016/17 apparition will coincide with the main part of the *Juno* orbital mission, and we will endeavour to keep up to date with events on the planet, providing information to inform scientists and public in selecting targets for *JunoCam* imaging and in understanding what is seen.

**John Rogers, Director**

## Saturn Section

This reporting period covers the later part of the 2014/15 and the initial part of 2015/16 apparitions of Saturn plus the 2015 and the early parts of the 2016 apparitions of Uranus and Neptune.

The following have provided observations to the section for these apparitions. Listed with each observer is a code (N, S or U for Neptune, Saturn and Uranus respectively). This indicates whether observations were provided for one or more of these planets.

Paul Abel – UK (N,S,U); Abdul Ahad – USA (N); Gianluigi Adamoli – Italy (N,S,U); Michael Andrews – UK (S); Francesco Badalotti – Italy (S); Kevin Bailey – UK (U), Trevor Barry – Australia (S); Stefan Buda – Australia (S); Andrew Clitherow UK (N,U); Emilio Colombo – Italy (S);

Marc Delcroix – France (N,U); Peter Edwards – UK (N,S,U); Mike Foulkes – UK (N,S,U); Clyde Foster – South Africa (N,S); Colin Henshaw – Saudi Arabia (N); Simon Kidd – UK (N,U); Massimo Giuntoli – Italy (S); David Gray – UK (S); Alan Heath – UK (S); Mike Hood – USA (S); Manos Kardasis – Greece (N,S,U); Geof Lewis – UK (S); Martin Lewis – UK (S,U); Stanislas Maksymowicz – France (N,U); Paul Maxson – USA (S); Richard McKim – UK (S); Darryl Milika & Pat Nicholas – Australia (N,S,U); Detlev Niechoy – Germany (S); Damian Peach – UK & Barbados (N,S,U); Bob Sayer – UK (S); John S. Sussenbach – The Netherlands (N,S,U); Dave Tyler – UK (S); Anthony Wesley – Australia (S).

**Uranus** was at opposition on 2015 October 12. Currently this has the most northerly declination of the three planets covered by the Section. It was well placed for observation by northern hemisphere observers but less so for those in the southern hemisphere.

At opposition, the planet's North Pole was inclined towards the Earth by approximately 38°.

Both visual observations and images were provided with many of the images taken in the infrared. The appearance of the planet showed some variations depending on the wavelength and telescope used. Typically a broad band was often recorded near the equator with a narrower band near the southern limb. Much of the northern hemisphere appeared bright but sometimes within this a darker band or darker region around the pole was recorded. Several observers were also able to record the five largest satellites.

Kevin Bailey (Section Uranus coordinator) has undertaken a preliminary analysis of these observations.

**Neptune** was at opposition on 2015 September 1. It attracted the attention of a larger number of observers compared to previous apparitions as can be seen in the list of observers given above.

Early in the apparition, amateurs were able to record storms on Neptune which had also been detected by professional observers (see the interim report mentioned below).

More recently on 2016 June 11, Darryl Milika & Pat Nicholas imaged another bright storm on the planet. Storms had already been detected by the Hubble Space Telescope and in images taken in the visible and infrared (1.0–1.7 $\mu$ m) wavelengths acquired with the *PlanetCam* instrument in the 2.2m telescope at Calar Alto Observatory in Spain. (Agustín Sánchez-Lavega, Santiago Pérez-Hoyos and Ricardo Hueso (UPV/EHU)).

A BAA e-bulletin (no. 922) was issued requesting more observations. Further images of Neptune showing storms have been taken by Milika & Nicholas plus John Sussenbach. A very preliminary analysis indicates that they may have recorded the same storms as the professionals in some of their observations. However an additional assessment and further observations are required to confirm this result.

A short note on these observations has been prepared for publication in the *Journal*.

Several observers were able to record Neptune's largest satellite Triton.

**Saturn** was at opposition on 2016 June 3. Its southerly declination meant that it was very well placed for observers in equatorial and southern hemisphere latitudes but poorly so for observers in high northerly latitudes.

Once again Trevor Barry has provided an extensive series of observations for this apparition. In addition, high resolution observations were made by all of the southern hemisphere observers and by Damian Peach when observing from Barbados.

At opposition, the north face of the rings was inclined at an angle of approximately 26° to Earth and hence obscured much of the southern hemisphere. The Seeliger effect (ring brightening) was reported around the time of opposition.

A number of belts and zones have been recorded plus ring detail; particularly in high-resolution observations. The Equatorial Zone was the brightest zone. Within this was a broad Equatorial Zone band. Further north was a darker North Equatorial Belt. Many colour images showed this to have a warm tone and high-resolution observations revealed a number of narrow components within this belt. One of the darkest belts that was detected both visually and by imaging was at approximate latitude of 50°N (planetographic). High-resolution observations have revealed the vertices of the North Polar Hexagon and a small dark spot at the North Pole.

A number of storms have been recorded at various latitudes, appearing either as dark or light spots. The most interesting feature has been a dark spot at high northern latitudes (approximately 63°N – planetographic)

which has also been recorded in recent apparitions. At the time of writing this report, a similar dark spot has been detected some 20° f.

John Sussenbach continues to maintain the Section website (<http://www.britastro.org/saturn>) which contains a selection of observations received. In addition it contains Section reports on Saturn published in the *Journal* since 1994/'95. These are all in pdf format.

Once again I would like to thank Richard Mckim for helping with the backlog of apparition reports. Several of the reports he generated were published in the *Journal* during this reporting period: 'Saturn in 1995–'96' (2015 August); 'Saturn in 1996–'97' (2015 December); 'Saturn in 1997–'98' (2016 February); 'Saturn in 1998–'99' (2016 April); 'Saturn in 1999–2000' (2016 June).

An interim report on Neptune during 2015 was published in the 2016 February *Journal* and a contribution was made to the paper 'The need for professional–amateur collaboration in studies of Jupiter and Saturn' by Kardasis *et al.* which also appeared in the 2016 February *Journal*.

The 2008/'09 apparition report has undergone the refereeing process and has been updated to address the referees' comments.

John Rogers presented an 'Observing the Planets' session at the Back to Basics meeting held at Cheltenham. The presentation included sections on observing the three planets covered by this Section.

**Mike Foulkes, Director**

## Comet Section

This is the first session under my Directorship and I would like to thank the previous Director, Jonathan Shanklin, for passing on a Section that is in such good shape. Jonathan was Director for 25 years and his extensive knowledge of comets is still available to us in the role of visual observations and analysis coordinator.

The Section website has been migrated to the BAA web server and now uses the standard BAA layout. This includes cometary news articles, observer profiles, back-issues of *Comet's Tale* and other comet-related information. The Section also runs an active mailing list which had 82 subscribers at the end of the session. Subscription is free via the Section webpage.

The Section's comet image archive is curated by Denis Buczynski and has a significant number of national and international contributors. The archive grew by around 3,000 images in the session and it also includes scans of images and drawings from the physical archive, particularly the old plates of Waterfield and Ridley. At the end of the session this archive contained a total of 14,324 images covering 680 different comets. The earliest entry is a drawing of the Daylight Comet of 1910 (1910a1) by W. B. Gibbs, made on 1910 January 27. The observers with the largest number of images submitted in the session were: Alfons Diepvens (587 images), Alexander Baranski (340), Peter Carson (321), Denis Buczynski (183), Tony Angel (162), Mike Olason (158) and Erik Bryssinck (110).

Peter Carson and Roger Dymock continue to deal with queries from members and non-members. Roger maintains the Project Alcock website which describes methods for photometry and astrometry of faint comets and techniques for observing comets using a DSLR. Richard Miles continues to lead our 29P project and several outbursts have been detected during the session.

This session has seen the first publication of the new-format *Comet's Tale*, edited by Janice McClean. This was issued in 2016 May and is available via the Section website. The first edition contained twelve short articles connected to comets and we hope to bring out the next edition in the autumn.

Comet observations (both visual and electronic) are now being submitted via the online Comet Observations database (COBS), though many are sent directly to the visual observations co-ordinator. The BAA is currently the largest contributor to COBS since we were able to import a large number of historical observations from our archive. The oldest BAA observation in the COBS archive is of 1P/Halley from 1909 and over 1000 new observations were submitted this session. The leading contributors were Kevin Hills (672 estimates), Graham Wolf (185), Marco Goiato (132), J. J. Gonzalez (117) and Carlos Labordena (106). Guy Hurst continues to publish the Section's observations in *The Astronomer* magazine.

The *Rosetta* mission continued to orbit comet 67P and the comet and spacecraft passed through perihelion during the session. Many Earth-based observations of the comet were received and these have helped to support professional interpretation of the *Rosetta* data. The Director gave a talk on pro-am cooperation in this field at the BAA meeting in Chelmsford in 2016 April. This talk is available on the BAA's *Youtube* channel.

The total number of designated comet discoveries or recoveries during the session was 80. Most of the discoveries were made by professional surveys. At the end of 2016 July, 341 periodic comets had received permanent numbers, an increase of 16 over the session. There were 185 confirmed SOHO discoveries in the year from 2015 July 1, bringing the total to 3163 at the end of 2016 June.

**Nick James, Director**

## Meteor Section

The 2015/'16 session was a very busy and successful one for the Section. Following its very constructive meeting in Birmingham in 2015 May, the Section participated in two highly successful joint meetings with the Comet Section and the Radio Astronomy Group during the session. At the Observers' Workshop on Comets and Meteors held at Burlington House on 2015 September 26, a range of speakers outlined the ways that modern technology is used in comet and meteor work and how the results can be used in scientific analysis. The topics covered included the links between periodic comets and major meteoroid streams, meteor orbit determination and advances in video techniques, combining video and radio meteor detection techniques, and video meteor detection using the *Raspberry Pi*. In the afternoon there were tutorial sessions on video meteor detection and analysis using the *SonotaCo* suite of tools.

On 2015 October 31, a Meteor Scatter Workshop was held at the Humfrey Rooms in Northampton in which speakers covered a range of topics relating to the detection of ionised meteor trails using radio equipment, both from the practical and theoretical viewpoints. An excellent summary of this meeting by Paul Hyde was published in the *Journal* (Vol. 125, No. 6, 2015 December, pp 381–383). The Director is most grateful to Nick James and Paul Hyde for organising these two meetings which did much to stimulate interest in meteor studies using a variety of observational methods.

There were many excellent observing opportunities during 2015/'16, beginning with a fine return of the annual Perseid shower in August, still a firm favourite with the majority of observers. Perseid activity had been expected to be above average in 2015 as a consequence of an encounter with one or more young dust trails and/or a favourable gravitational perturbation by Jupiter, which shifts the centre of the meteoroid stream earthwards. This was certainly noticeable in 2015, although the maximum enhancement by these effects was expected in 2016 and 2017. To encourage observers to go out and monitor the shower, the Director produced a 'Notes and News' piece for the *Journal* (Vol. 125, No. 4, 2015 August, p 191) and a feature article for *Astronomy Now*. Peak activity coincided with New Moon so conditions with respect to moonlight were favourable, but weather conditions were unfortunately rather variable across the UK at this time. With maximum expected at around 06h, the pre-dawn hours of August 13 yielded the best observed rates, with the calculated ZHR rising from 80 meteors per hour at midnight to almost 100 m/h as dawn intervened. A respectable ZHR of 40–50 m/h was also noted on Aug 11/12 and Aug 13/14.

The autumn of 2015 was also good for meteor observers with the Orionids in October yielding a ZHR of 25–30 m/h in the period from Oct 21–23. In December, the maximum of the Geminids occurred just after new Moon and observers recorded a very strong display. Unfortunately, the peak ZHR above 150 m/h occurred during daylight hours on Dec 14 from the UK, so the highest observed rates were noted in the pre-dawn hours of Dec 14 and during the following evening.

The peak of the Quadrantids occurred just after dawn in the UK on 2016 January 4, and observers noted a fine display with a ZHR approaching 100 m/h in the early morning hours. Few observations of the April Lyrids were reported, with any watches being seriously hampered

by bright moonlight. The Eta Aquarids in early May coincided with new Moon, and a few shower members were observed in the eastern sky as the radiant rose before dawn. The complex of southern showers which peaks in late July were also well placed with respect to the Moon this year, and the combined activity of all these showers provided observers with good observed rates at this time although weather conditions were again quite variable.

As always, observations away from the principal shower maxima are just as important to the work of the Meteor Section as those obtained when high rates are anticipated. Unfortunately, very few visual observers contribute observations away from the times of the major showers. So, it is most important that the UK's network of automated video cameras continues to expand, thanks particularly to the tireless efforts of Section Committee members William Stewart (Ravensmoor) and Alex Pratt (Leeds), the founders of NEMETODE (<http://www.nemetode.org>). This network is contributing a growing body of important data on meteor activity throughout the year.

The expansion of the automated video camera network has been achieved not only by new observers joining the team, but also by existing observers adding new cameras to their set-up to increase their sky coverage. Unusually high activity from the July Gamma Draconid shower was detected by NEMETODE observers around midnight on 2016 July 27/28. In spite of large amounts of scattered cloud and the short duration of the outburst, Alex Pratt reports that there are at least 10 multi-station events with a compact radiant and they should provide a good measure of shower parameters.

Three papers or articles appeared in the *Journal* during the session summarising the work of the NEMETODE observers: 'Perseids 2013: Multi-station videography', by Pratt, Stewart, Foyle, Entwisle & O'Connell, Vol. 125, No. 4, 2015 August, pp 217–219; 'Quadrantids 2014: Multi-station videography' by Pratt, Stewart, Foyle, Anderson & O'Connell, Vol. 125, No. 6, 2015 December, pp 362–364; and 'An indoor video meteor camera station' by Alex Pratt, Vol. 126, No. 1, 2016 February, p 55. In 2015/16, for the first time, there has been increasing collaboration with members of UKMON, who operate a similar network of automated video cameras in the UK which also includes many Meteor Section members.

In some cases, stimulated by the important pioneering work of Section Committee member Bill Ward, observers have also added diffraction gratings to some of their video cameras to carry out meteor spectroscopy. This is an important aspect of meteor studies because it enables the chemical composition of the incoming meteoroids to be determined. A paper by Bill Ward on the analysis of a Perseid fireball spectrum was submitted for publication in the *Journal* during the session. There has also been a most welcome increase in the number of observers acquiring and operating the radio equipment needed to detect and count the ionised trails produced by meteors. This is a consequence of the valuable practical guidance provided by Paul Hyde and fellow members of the BAA's Radio Astronomy Group. The joint meeting in Northampton mentioned above was an important stimulus in this regard.

An interesting outcome from the joint video and radio meteor studies has been the research conducted by Richard Fleet, in which he correlated the occurrence times of triangulated meteors captured by the video camera networks with those recorded simultaneously by a radio receiver tuned to the transmitter of the GRAVES radar-based space surveillance system (operating at 143.050 MHz) located near Dijon in central eastern France. He found that the majority of the trails detected simultaneously by both techniques were located much further north than had been previously supposed – a probable consequence of the backlobe emission from the GRAVES antenna array.

The 2015/16 session produced several bright fireballs where little by way of accurate information about the atmospheric path or trajectory of the object could be gleaned from casual visual observers. However, an event which occurred on 2016 March 17 at 03:16:55 UT, subsequently known as the St Patrick's Day fireball, was recorded as sky brightening or intense flashes on many video cameras, though for the majority the trail was outside of their field of view. A lesser event on 2016 June 25 at 02:02:26 UT was widely observed by both visual observers and video cameras of the UK networks.

As always, the Director is extremely grateful to all members of the Section Committee for their continued support, enthusiasm and encouragement, especially Leonard Entwisle, Tracie Louise Heywood, Nick

James, Alex Pratt, William Stewart and Bill Ward. The Director has continued to provide the data for the Meteor Diary in the BAA *Handbook* and the list of Principal Meteor Showers in the Diary of the Royal Astronomical Society.

**John W. Mason**, Director

## Aurora Section

### Aurora

The decline from solar maximum continued into 2015 and auroral sightings increased again in 2015 August with darker skies arriving following the brighter summer months. Large sunspots associated with solar flares and coronal mass ejections (CME) were, by this time, comparatively uncommon and auroral displays were usually associated with coronal holes allowing an increase in solar wind speeds, quite frequently augmented by a southerly turn to the Bz. Aurora was observed on a number of nights in August and widely reported displays occurred in the middle and towards the end of the month. With the equinox in September, it is usually a good time for the aurora but this was not so in 2015 with fewer displays than in other months. However, there were quite frequent displays from then until the end of the year with a memorable one on the last night of the year and into New Year's morning.

Moving into 2016, January and February turned out to be quite lean months, but around the equinox in March, aurora was reported on a number of nights, notably that of March 06/07 when reports were received from all parts of the UK including quite southerly latitudes. April and May produced a few reasonable displays before brighter evenings made observation difficult.

### Noctilucent clouds (NLC)

The 2015 NLC season ended with a few reports being received in the first two weeks of August, ending with a reasonably good display seen on August 15/16. Ice in the mesosphere was noted until August 21 but only at very high latitudes.

The 2016 NLC season started rather quietly and a few days later than in recent years. Ice in the mesosphere was first recorded on May 24 but the first notable NLC display occurred on June 02/03. Reports during June were relatively infrequent despite ice being prominent in the mesosphere from early June. Lack of NLC reports did not indicate negative sightings but reflected the very poor sky conditions which prevailed over most of the UK and much of Europe throughout June.

July proved to be a little better with a widely observed display on 01/02, a particularly notable display on 05/06 and a number of other nights on which NLC was quite widely seen. A fine display of NLC was seen in the early hours of July 22/23 in northern UK. The last week in July produced very few reports. It is notable that NLC was less frequently seen before midnight in 2016 than in other years and this does not seem to be associated with poorer sky conditions. Images taken by Horst Meyerdierks and Ken Kennedy at intervals throughout the night have proven to be useful in picking up faint NLC, especially before dawn.

### The Section

Aurora Section newsletters were sent out to 125 observers in 2015 November and 2016 April and reports are regularly received from a number of these observers. It is encouraging that some auroral reports were from observers in more southerly latitudes which reflects the increased solar activity following solar maximum and associated with high speed solar wind streams.

Several talks have been given by various officers throughout the year, aurora images have been supplied for talks by other Sections and aurora observations for the past four years were passed to the Astrophysikalisches Institut in Jena, Germany following a request by Daniel Wagner.

Sandra Brantingham was appointed Aurora Section Director in 2016 May following the retirement from the post by Ken Kennedy. Ken Kennedy has remained with the Section as an Assistant Director with particular interest in noctilucent clouds. Dave Gavine has also retired from the Section but Ron Livesey remains as an Assistant Director and deals with fluctuations in geomagnetism. Thanks go again to Tom McEwan



for access to his NLC website, [ed-co.net/nlcnnet](http://ed-co.net/nlcnnet), and the ease with which reports can be entered. The Section officers also thank all those observers who have sent reports and images of auroral and NLC displays during the past year.

**Sandra Brantingham**, *Director*

## Variable Star Section

(As in previous years, due to restrictions imposed by the observational databases, the VSS report covers the 2015 calendar year rather than the Session year).

Following a serious illness Melvyn Taylor stepped down from his position as Binocular Secretary in mid-2015 and I'm delighted to say that Shaun Albrighton accepted the position and officially took over from Melvyn at the end of 2015 July.

I'm also pleased to advise that Melvyn is now very much better, although not completely recovered.

Melvyn put in a tremendous amount of work for the Section in various positions from 1978 until 2015. These included Binocular Co-ordinator/Secretary and Assistant Director. Thank-you, Melvyn.

R Coronae Borealis continues to take pride of place in the VS 'High-lights'. It has still failed to attain its 'normal' magnitude of 6.0 as in mid-2015 it plummeted again to almost mag 13 before slowing to dip below mag 14 in spring 2016.

### BAA VSS Database Report – Calendar Year 2015

#### Observations Received for 2015

A total of 104,477 observations has been loaded into the Variable Star Section database for the 2015 calendar year. This total was accomplished by the efforts of 39 observers measuring the magnitudes of 969 different stars.

The breakdown of observations by method is as follows.

Method	Variable Stars	Observations	Observers
Visual	801	35,458	28
CCD	269	67,708	12
DSLR	21	1,311	3

The overall number of active observers has stayed the same from 2014 to 2015, though the split has changed, with 1 more visual observer, 3 fewer CCD observers and 2 more DSLR observers. Also, although the total number of observations was about 8,000 fewer in 2015 than 2014, the number of objects observed was slightly up for all 3 observing methods.

#### Visual Observations

The visual observations received for 2015 were as follows:

T Markham, 9190; G Poyner, 7741; J Toone, 6169; P B Withers, 2160; G M Hurst, 2032; R A H Paterson, 1430; M J Gainsford, 1376; R C Dryden, 1034; S W Albrighton, 1000; R Pearce, 718; M Barrett, 658; J D Shanklin, 641; T Vale, 408; V Hull, 361; R J Livesey, 154; D Scanlan, 106; N White, 76; I Miller, 46; R K Hunt, 42; J Thorpe, 31; P Bishop, 21; J Whinfrey, 14; P G Abel, 13; T Jones, 11; C Mann, 10; R D Pickard, 9; A J Wilson, 6; S Jenner, 1.

The top 10 variable stars observed visually during 2015 were as follows:

#### Outbursts of recurrent objects in 2015

Star	Mag	Band	Date	Observers
V701 Tau	15.4	C	Feb 16.120	K. Paxon, G. Poyner, R. Pickard
AL Com	14.5	V	Mar 04.582	K. Hills, Paxon, J. Shears
VY Aqr	11.6	Vis	Mar 28.736	ASASSN, R. Stubbings
V404 Cyg	16.2	C	Jun 16.169	E. Muylaert (BRT), SWIFT
V725 Aql	14.0	Vis	Sep 20.889	Muylaert
PNVJ21581852				
+2419246	14.8	C	Oct 02.023	Muylaert (BRT)
V1454 Cyg	15.2	C	Nov 05.885	Shears
V701 Tau	15.3	C	Nov 12.481	M. Hiraga
AL Com	15.7	V	Nov 13.261	Hills
V725 Aql	14.3	C	Dec 21.722	Shears

C= unfiltered CCD, V= CCD+V filter, Vis= visual

R CRB, 486 observations by 14 observers; Z CAM, 456 by 8; CH CYG, 413 by 9; SS CYG, 360 by 10; T CRB, 329 by 7; SS AUR, 321 by 8; U GEM, 294 by 10; RX AND, 289 by 9; SU UMA, 277 by 8; RHO CAS, 274 by 5.

In addition to the above, the following observers submitted observations in paper format although these have not yet been loaded into the database: Len Brundle 2028, Ron Livesey 435, Dave Gavine 372, Rhona Fraser 116 and John Meacham 72.

#### CCD Observations

The CCD observations received for 2015 were as follows:

I Miller, 18728; R D Pickard, 18360; D Boyd, 17670; D Barrett, 4402; A Rodda, 2673; G Darlington, 1773; D S Conner, 1718; S Johnston, 1233; J T Screech, 1116; J H Mallett, 21; G Poyner, 9; M Mobberley, 5.

The top 10 variable stars observed by CCD during 2015 were:

ASASSN-14MV, 3556 observations by 2 observers; V404 CYG, 2993 by 5; AM HER, 2785 by 2; V SGE, 2417 by 1; V452 CAS, 2289 by 4; NSV 2026, 2041 by 4; AL COM, 2004 by 3; DW UMa, 1747 by 2; KIC 8462852, 1521 by 2; AC Cnc, 1360 by 2.

#### DSLR Observations

The DSLR observations received for 2015 were as follows:

J T Screech, 685; D Loughney, 454; I S Megson, 172.

The top 10 variable stars observed by DSLR during 2015 were:

EG CEP, 485 observations by 1 observer; V477 CYG, 83 by 1; AH CEP, 77 by 1; AO CAS, 64 by 1; DS AND, 61 by 1; ZZ CEP, 58 by 1; RHO CAS, 55 by 1; IM AUR, 53 by 1; Z UMA, 50 by 1; RX CAS, 47 by 1.

#### BAA VSS Observations sent to the AAVSO International Database

During 2015 the BAA VSS continued to send observations to the AAVSO on a quarterly basis. Each set of observations included new observations submitted during the quarter, as well as a list of amendments to existing observations made during the quarter. The AAVSO screens the observations for those they have already received directly from observers, so that observations are not doubled up in the AAVSO International Database.

#### The Recurrent Objects Programme – Gary Poyner

A slight increase occurred in the number of outburst detections during 2015 over the previous year, with 10 outbursts reported through the BAAVSS alert group, CVnet and VSnet.

The Bradford Robotic Telescope and the network of AAVSONet robotic telescopes continue to be utilised for the detection of outbursts for objects on the ROP. UK based observers Jeremy Shears, Guy Hurst and Gary Poyner continue to use the BRT extensively for patrolling for ROP activity, together with their own instruments. Belgian observer Eddy Muylaert continues to make a major contribution to the ROP with outburst and follow-up observations with the BRT.

The few visual observers who continue to monitor ROP targets face challenging times in their efforts to detect outbursts before the numerous robotic surveys now employed to detect supernovae and other transients. Outbursts continue to be detected at much fainter levels than in the past thanks to CCDs being employed on most telescopes operating in this field. Follow up observations with time-series photometry, employed by the more dedicated CV enthusiast, continue to increase our knowledge on the systems under observation and the long-term behaviour of these enigmatic objects.

New objects are being discovered daily, primarily with ASASSN (All Sky Automated Survey for Supernovae). Future updates to the ROP will take many of these new objects under consideration, but as there are so many it will be a difficult task to keep a good balance to the programme without 'swamping' it with the new ASASSN discoveries. There were no updates to the programme during 2015, with a planned review of the programme to be made sometime in 2016.

Charts for ROP targets are available from the VSS chart curator John Toone, the BAAVSS web pages and the Variable Star Plotter for the AAVSO. The co-ordinator Gary Poyner wishes to acknowledge visual and CCD observations and images reported to him *directly* by the following observers: D. Buczynski, G. Hurst, N. James, M. Mobberley, I. Miller, E. Muylaert, R. Pickard, J. Shears and P. B. Withers. Further details of the ROP can be found on the VSS web pages.

#### The Long Term Polar Monitoring Programme (LTPMP)

When this programme was launched in 2006 it was intended to run for

ten years only, in order that a decent dataset be obtained on a number of objects whose priority in the amateur community was rather low. A five year report was published in the JBAA in 2012, and it is anticipated that the programme will be terminated at the end of 2016 with a second report on activity from 2011–2016.

In the meantime as in previous years this programme continues to be covered primarily by CCD observers, with occasional visual observations obtained where the target is bright enough. The co-ordinator G. Poyner obtained CCD V-band data on all programme stars using the AAVSO Sonoita Research Observatory 0.5m Newtonian telescope in Arizona, the W-30 SCT in California and the BRT. Further CCD data has also been received from G. Darlington, S. Johnston, I. Miller, R. Pickard and J. Shears. Visual observations continue to remain the territory of the co-ordinator G. Poyner.

Details of the programme can be found on the BAAVSS web pages.

#### CCD target list 2015 – Jeremy Shears

Variable stars offer the amateur astronomer equipped with a small telescope and CCD camera great opportunities for doing some real science with their equipment. Essentially, if you are already able to produce reasonable images with your camera, you can turn it to variable stars with good effect. The CCD Target List contains a range of projects, including collecting data on eclipsing binaries and cataclysmic variables (CVs). In some projects, it simply involves taking a few images to check whether a CV is in outburst or not (a word of warning here: catching a rare outburst is both exciting and addictive, so you might get hooked!) and if it is, to measure the brightness.

In other cases, it involves taking a succession of images of the same target, often for a few hours. Photometry from the resulting time-series is then extracted, with simple-to-use software, to yield a lightcurve of the object. For some projects filters are recommended, but for others unfiltered observations are fine.

During the year, a campaign was orchestrated to observe a suspected dwarf nova identified by John Greaves from his analysis of photometry from the Catalina Sky Survey (the object is designated CSS 121005:212625+201948 and lies in Pegasus). He noted that the star was very frequently in outburst. The campaign received much interest from observers, with data submitted by David Boyd, James Boardman, Juan-Luis González Carballo, Ian Miller, Kenneth Menzies, Roger Pickard, Gary Poyner, Richard Sabo, Pavol Dubovský, Richard Sargent, Denis Buczynski and Jeremy Shears.

The campaign was launched in 2014 June and continued until the end of the observing season in 2015 February, as the star became inaccessible in the evening twilight. The results confirmed that the object was an SU UMa-type dwarf nova, with one of the shortest supercycles (the time between superoutbursts) at 67d. A paper summarising the results has been published in the *Journal*.

The results of this campaign once again demonstrate the value of intensive and co-ordinated monitoring of CVs by amateur astronomers possessing relatively simple equipment, complemented with time-resolved photometry at multiple longitudes during outbursts.

#### Eclipsing Binary Report 2015/2016 – Des Loughney

Predictions of Algol, RZ Cas and Lambda Tau eclipses have been provided for the BAA *Handbook*. There has been a change for the 2017 *Handbook*. Predictions for RS CVn have been substituted for Lambda Tau eclipses. Predictions for a range of EA and EB eclipsing systems are available on the Section's website. In the VSS *Circular* an article continues to be published on 'Eclipsing Binary Predictions – Where to find them'. 'Eclipsing Binary News' continues to be a regular feature of the VSSC.

The *Eclipsing Binary Handbook*, which is available on our website, has been updated and amended during the year. Internationally recognised amendments to the classification of EBs have been included. The revision to the observing programmes has been completed. There are now four sets of observing programmes, including the Beginners Eclipsing Binaries and the Priority Eclipsing Binaries. During the revision it became known that members of the Section were also observing other eclipsing binaries and submitting observations. Thus a list of 'Other Eclipsing Binaries' has been added to the *Handbook*. Finally the list of ten 'Low Amplitude Eclipsing Binaries' has been added. The latter are particularly suitable for practitioners of DSLR photometry.

Arising from enquiries received from members during the past year it is planned to make further amendments to the online version of the *Handbook*. One amendment will be guidance on the standard of observations expected by the Krakow database for the direct submission of times of mid-primary minima. Another will be comments on why variable star organisations have different predicted times for the minima of the same eclipsing binary. The different predictions can vary by hours. This can be confusing.

It is planned over the next year to do a study of data mining techniques to analyse the behaviour and periods of EBs. The data can arise from the digitalisation of old photographic plates or as an offshoot of survey programmes.

Numerous requests for information during the year have been answered, covering such topics as suitable EBs for observing programmes, construction of graphs to estimate minima and information about individual EBs.

#### BAAVSS Chart Report 2015–John Toone

In 2015 work has commenced on preparing extended sequence files for consolidating legacy visual data for stars on the current observing programmes. This will eventually allow the legacy data to be refined to extract maximum scientific value. The work of expanding the sequence files is expected to take several years. In 2016 updated sequence files (and some charts) will be prepared for the Mira stars dropped from the Main Programme in 1974.

#### VSS Mentoring Scheme

Advice continues to be offered to both new visual and CCD observers about the basics as well as the intricacies of variable star observing, and several new observers took advantage of the scheme in 2015.

#### Publications

Janet Simpson again produced four *Circulars* during the year in both paper and PDF format.

Papers or other articles published in the BAA *Journal* were:

- 'Photometric & spectroscopic observations of the 2014 eclipse of the complex binary system EE Cephei', David Boyd (**125**(2), 94);
- 'Changes in the spectrum of Z Ursae Majoris during its rise through a maximum in 2014 June', David Boyd (**125**(3), 162);
- 'HW Boötis: an enigmatic cataclysmic variable star', Jeremy Shears *et al.* (**125**(4), 236);
- 'V404 Cygni: a black hole awakens', Gary Poyner & Nick James, (**125**(4), 191);
- 'Three supernova discoveries in a month for Ron Arbour!', Callum Potter & Roger Pickard (**125**(4), 191);
- 'A summer of variable stars', Gary Poyner, (**125**(4), 248);
- 'Spectral changes in AC Herculis during its rise to a maximum in 2014 July', David Boyd, (**125**(5), 279);
- 'The eclipsing binary HS0705+6700 and the search for circumbinary objects', David Pulley *et al.* (**125**(5), 284);
- 'Chi Cygni in 2015', Gary Poyner (**125**(5), 259);
- 'Optical outbursts of the cataclysmic variable 1RXS J140429.5+172352', Jeremy Shears *et al.* (**125**(5), 358).

#### Members' Meeting

There was no Section Members' Meeting in 2015, but there was a very well attended Spectroscopy Workshop at the Norman Lockyer Observatory, Sidmouth, Devon, on 2015 October 10. The speakers were Olivier Thizy, Andy Wilson, Robin Leadbeater and David Boyd.

#### Membership

As of 2015 December 31, 189 observers and others were in receipt of the VSS *Circulars*.

Once again, the Director would like to thank all the Section Officers without whose help running the Section would be an impossibility.

The Director also wishes to acknowledge use of the LCOGT group of telescopes which includes the Faulkes Telescopes.

**Roger Pickard**, Director

## Discoveries by the UK Nova/Supernova Patrol in the session ending 2016 July 31

Date	Object	Galaxy	Discoverer	Mag	ECirc
2015 Sep 7	PSNJ17201537	MCG+7-36-01	R. Arbour	16.2	3107
2015 Sep 18	PSNJ18354527	PCG2395135	Arbour	17.8V	3108
2015 Nov 22	PNVJ00433852	Messier 31	G. Carey	17:	3125
2015 Dec 24	PSNJ18333953	NGC 6677	Arbour	16.3	3132
2016 Jan 19	AT 2016V	NGC 7568	Arbour	17.0	3138
2016 Mar 13	SN 2016bau	NGC 3631	Arbour	17.85V	3153

*ECirc* refers to the *Electronic Circulars of The Astronomer* where discoveries are first announced by the Patrol.

### Notes:

1) In the table of last year's report, the object in NGC 5837 was belatedly designated SN 2015Z (CBET 4171, ECIRC 3124).

2) The object found by George Carey (above) was a nova in the Andromeda Galaxy. It was the tenth nova found by the patrol and the fifth located in M31. It was an independent discovery also made by K. Homoch (ATEL 8327).

3) PSNJ18354527: G. Masi, imaged remotely using the 17" f/6.8 robotic unit part of the Virtual Telescope Project facility, at Bellatrix Astronomical Observatory

4) PSNJ18333953 was also imaged in response to the alert by Martin Mobberley, Denis Buczynski and Peter Carson.

5) The object in NGC 2770 mentioned in last year's report as a possible 'SN imposter' and found by Ron Arbour has since been reclassified and designated as SN 2015bh (CBET 4229) which, with the latest discoveries, brings Ron's cumulative total to 42.

## UK Nova/Supernova Patrol

The patrol continues to be coordinated by both the Association's Variable Star and Deep Sky Sections and also *The Astronomer* magazine. In addition some overseas active observers who are members of other groups have become involved in the patrol's efforts.

Though the discovery of novae and supernovae remains the main aim, it is becoming increasingly apparent from discussions with professionals that detections of the wide variety of 'transient outbursts' and follow-up studies are also important. As an example the announcement of GRB 150910A (ECIRC 3105, 3106) and an appeal for detection of an optical counterpart brought success when Peter Birtwhistle recorded it on Sept 10.909UT at an incredibly faint R magnitude of 20.4.

Other detections included supernova imposters which are usually Luminous Blue Variables (LBV). Ron Arbour detected a further outburst of such an object at mag 17.1V on 2016 Apr 5 in NGC 4559C. (ECIRC 3159).

The series of talks by the coordinator around the country has continued. A mere month after he gave a talk at Bromsgrove Astronomical Society in 2015 October and met George Carey, George made his first nova discovery!

In recognition of extensive contributions to astronomy and especially his supernova discoveries for the patrol (155), the BAA presented Tom Boles with the prestigious Walter Goodacre Award at its meeting in London on 2016 May 25. We offer congratulations to Tom on this well deserved recognition.

Please contact the undersigned for further details if interested in any aspect of the patrol.

**Guy M. Hurst**, *Coordinator*

## Deep Sky Section

The Section's annual meeting was held on Saturday 2016 February 27, with around 100 attending. The meeting was hosted by the Rugby & District Astronomical Society, at Church Lawford Village Hall, Church Lawford, Rugby, Warwickshire.

At the meeting the Director gave his review of the Section year, and showed a selection of images received.

Speakers were Andrew Robertson – 'Observing with a 24" [600mm] Dobsonian telescope'; Owen Brazell – 'Tools to find Planetary Nebulae'; Andrew Luck – 'Automating a home observatory'; Cameron Watson – 'Starting out in astro-imaging'; and Jeremy Shears – 'Galaxies in the desert: Harold Knox-Shaw and the Reynolds telescope'.

The professional astronomer speaking was Dr Amélie Saintonge (UCL) whose talk was entitled 'Feeding, fireworks and feedback: the formation

and evolution of galaxies'.

Much thanks goes to Chris Longthorn and the members of Rugby & District AS who helped make the day go without a hitch. The 2017 Section meeting will be held on March 4 near Newbury, Berkshire, hosted by Newbury Astronomical Society.

### Observations

Forty four members submitted observations during the year.

The majority of observations received were digital images of the brighter and more popular deep sky objects, although there are still several members sending in visual reports. Planetary nebulae observations are still being made though do not seem to be so popular.

Grant Privett stood down last session from coordinating the Variable Nebulae observing programme and Mike Harlow kindly volunteered to take on this role.

The Globular Cluster and Caldwell Objects observing programmes have been popular though many targets remain to be observed.

Ron Arbour has had further supernova discovery successes. See the UK Nova/Supernova Patrol report above for full details of his discoveries.

### The Section

Section membership now stands at 148.

The Section Newsletter containing news, articles, updates on observing programmes and members' images was issued only once, in 2015 October. The Director aims to get back to a normal schedule of three/four per year in the next session. Members' observations are often printed in Observers' Forum of the *Journal*.

The Section website has had basic maintenance. It is a goal to improve the site content in the next session.

**Callum Potter**, *Director*

## Instruments and Imaging Section

The Section continues to deal with all aspects of practical astronomy. The Section publications – *I&I News* and *Technical Tips* – are issued directly to all BAA Members with a registered e-mail address, and are also available for download from the Members Only area of the main BAA website, with a link provided on the Section website. The majority of enquiries received have been concerned with instruments, maintenance of equipment, and telescope making – as much related to visual observation as to imaging. As usual, advice has been sought not only by tyros but also by experienced veterans with technical questions which often concern software and electronic hardware.

In addition, there has been an administrative change concerning the Association's collection of instruments. There was a time when several new instruments were acquired each year and there were frequent transfers of loan, but with the profusion of equipment now available commercially the purpose and utility of the collection has been reduced dramatically, and in recent times it has remained almost entirely quiescent. In order to establish whether or not this decline is unique to the Association, the membership was consulted, and the results of this survey indicated the same very noticeable trend in local and regional societies in Britain and worldwide. Consequently, the post of Curator of Instruments has been dissolved, and the loan collection, which has been purged of ineffectual and obsolete equipment, is now the responsibility of the Director of the Instruments and Imaging Section. There is no change of personnel, as the current Director was appointed Curator in 1991.

**R. A. Marriott**, *Director*

## Computing Section

A large part of the work carried out by the Section continues to be the production of the annual *Handbook*. The 2017 edition is included with this *Journal* and is also available to members on the BAA website for download in PDF form, which has the advantage that the material can be cut and pasted if required, and also the URLs (web links) can be clicked on to take you directly to the referred website. (Please check with the

Director first if you wish to re-publish any *Handbook* material).

We have many people to thank for the data, which they submit for use in the *Handbook*. I would also like to thank them for checking their own and other contributors' material. I would especially like to thank Richard Miles for his extensive help in proof checking and corrections.

Printing of the *Handbook* was once again ably handled by the printers.

The other main segment of the Section's work is the website – <http://britastro.org/computing>.

This is a marvellous resource of both useful information and 'applets' (small self-contained functional programs) to assist with your observations. Many of the applets are of significant value to members of other Sections, in particular the Variable Star and Asteroids & Remote Planets Sections.

Applets available on the website include:

- What's observable? – make an observing list (including Kreutz comets);
- A digital orrery – plan view of the Solar System;
- The Galilean satellites of Jupiter;
- The 8 main satellites of Saturn;
- Julian date – calendar converter;
- Date/time intervals (e.g., for variable star min/max prediction);
- Equatorial coordinates & precession;
- Camera field of view and star trail calculator;
- Angle subtended, object size and distance;
- Finder charts for comets;
- Asteroid opposition charts.

Extensive work has taken place to update the asteroid appulse charts pages, which are now listed for several months in advance. Maintaining charts for comets and asteroid oppositions is also kept up to date.

We also produced our second *Newsletter* containing news items, an Eliot Hall interview with Emil Kraaikamp (author of the software AutoStakkert!) and a variety of articles. We hope to continue with more *Newsletters* in the future.

If you would like to help with the work of the Section, such as with the *Handbook*, software for the website, or articles for the *Newsletter* then please don't hesitate to get in contact.

**Steve Harvey, Director**

## Historical Section

The centre point of the Section's year is our annual meeting. This year's Section meeting took place on 2016 May 21, at the Quaker Meeting House, Liverpool, the home of Liverpool Astronomical Society. Our meeting had a theme of 'Observational Astronomy through the Ages', and we had five excellent speakers. Gerard Gilligan began the day by telling us about the distinguished history of Liverpool AS, and then Kevin Kilburn gave us a fascinating insight into the astronomical alignments of stone circles and other antiquities in the Peak District, in 'The Bridestones Legacy'.

After lunch, Christopher Taylor enthused about William Herschel's superb observing techniques, recording distant galaxies out into the Hubble flow, in 'William Herschel and the Expansion of the Universe', and then Bob Marriott, a regular contributor to Section meetings, surprised us with a number of unexpected 'Lancashire Emigrants', including John William Draper, early astro-photographer, and Ralph Copeland, Astronomer Royal for Scotland. Our keynote speaker was Professor Bill Leatherbarrow, director of the Lunar Section, who told us about 'Patrick Moore and our Volcanic Moon'.

After the meeting, a number of the delegates went on to visit Liverpool AS's observatory, at Pex Hill, near Runcorn. We are very grateful to Liverpool AS for their assistance on the day and support for the event. For next year's meeting, we are looking at venues in the Midlands, and for 2018 we expect to hold a Section meeting in Scotland.

It was also good to see in Liverpool a number of attendees from our

sister society, the Society for the History of Astronomy; we invited their Chairman, Bob Bower, to give a short talk on the upcoming events for their society – I was able to do the same for the BAA at an SHA conference earlier in the year. Our two societies aim to work closely together, to the benefit of both.

There continues to be a steady supply of papers on historical topics in the *Journal*. Martin Mobberley gave us papers on Patrick Henry Hepburn, and the BAA total solar eclipse expedition of 1936. Jeremy Shears continued his run of papers on significant figures from the history of the BAA with articles on David Elijah Packer, Edwin Holmes, and William Sadler Franks.

The Section continues to be in good health. I am grateful to all those who have contributed to its success. I have been remiss in previous years not to mention Barry Hetherington's annual list of centenaries – we greatly appreciate the work which goes into producing this hugely useful resource. Finally, I am grateful to the Section's deputy director, Dr Lee Macdonald, for his invaluable support and advice.

**Mike Frost, Director**

## Radio Astronomy Group

The Group's year started with a one-day Workshop meeting at Northampton on meteor radio scatter, held in conjunction with the BAA Meteor Section. This was another sell-out event, demonstrating the interest in what is one of the few home-based radio applications still possible given modern levels of radio noise. The keynote speaker was Jean-Louis Rault, head of the International Meteor Organisation's Radio Commission, who provided an excellent description of the work possible in this area, with a further eight speakers providing contributions on their own observations and work.

An important contribution came from Richard Fleet who described his work in matching radio events to images captured by video camera networks. This provided compelling evidence that meteor events over the UK and northern Europe are being illuminated by the GRAVES radar system in southern France. In response to this a new Discussion Board was set up by Ian Williams in 2015 December, supported by both the NEMETODE and UKMON video networks, with the aim of further developing this work. A further meteor scatter workshop event was held at the NSC in March reviewing progress and the potential for further work.

Early in 2016 Paul Hyde announced that he would be standing down as Coordinator for the Group after nearly six years in the role. An open meeting was held at the NSC in March, with fourteen participants voicing their support for continuation of the Group's activities. BAA Council subsequently appointed Jeff Lashley as the new Coordinator, taking over from Paul in 2016 May.

The past year has seen the publication of three editions of the RAGazine newsletter, all edited by Jeff Lashley. These have included contributions on solar eclipse observations (Jean-Jacques Maintoux), amateur pulsar detection (Peter East), radio astronomy with the Raspberry Pi (Mario Cannistra), receiver performance comparisons (Tony Abbey) and Python programming (Jeff Lashley), along with regular VLF and magnetometry reports from John Cook.

Elsewhere, Group members have provided presentations to local astronomy and radio societies around the country, the BAA Back to Basics meeting at St Asaph, North Wales, and the EUCARA 2016 conference in Dwingeloo, Netherlands. A particularly rewarding exercise was a Skype-delivered presentation to young students at Brannel School in Cornwall, given by Paul Hyde.

Particular thanks go to John Cook for his continuing work in coordinating VLF and magnetometer observations, and to Karen Holland, Chris Jackson, Victoria Penrice, William Stewart and Ian Williams for their contributions and support during the past year.

**Jeff Lashley & Paul Hyde, Coordinators**

## Section Officers

The following list of Section Officers is current from 2016 October 26.

<b>Solar</b>			
<i>Assistant Directors</i>	Mike Beales John Cook		
<b>Lunar</b>			
<i>Assistant Director</i>			
<i>BAA/ALPO Lunar Changes Programme</i>	Tony Cook		
<i>Section Committee</i>	Barry Fitz-Gerald		
<i>Occultations coordinator</i>	Tim Haymes		
<i>Historical consultant</i>	Robert Garfinkle		
<i>Lunar Domes Programme</i>	Raffaello Lena		
<i>Co-Editor, The Moon: Occasional papers of the BAA Lunar Section</i>	Nigel Longshaw		
<b>Mercury &amp; Venus</b>			
<i>Section Committee</i>	Richard Baum, Keith Blaxall, Mario Frassati, Alan Heath, Bill Leatherbarrow, Paul Abel		
<i>Website manager</i>	David Arditti		
<b>Mars</b>			
<i>Website manager</i>	Bob Marriott		
<b>Asteroids &amp; Remote Planets</b>			
<i>Assistant Director (Astrometry)</i>	Peter Birtwhistle		
<i>Assistant Director (Occultations)</i>	Tim Haymes		
<i>Website manager</i>	(vacant)		
<b>Jupiter</b>			
<i>Section Committee</i>	Mike Foulkes, Hans-Jörg Mettig, Damian Peach, Gianluigi Adamoli, David Arditti.		
<i>Website manager</i>	Damian Peach		
<b>Saturn</b>			
<i>Assistant Directors</i>	David Graham Paul Abel John Sussenbach		
<i>Uranus Coordinator</i>	Kevin Bailey		
<b>Comet</b>			
<i>Visual observations &amp; analysis</i>	Jonathan Shanklin		
<i>Secretary</i>	Denis Buczynski		
<i>TA liaison</i>	Guy Hurst		
<i>CCD imaging adviser</i>	Peter Carson		
<i>Outreach &amp; mentoring</i>	Roger Dymock		
<i>Newsletter editor</i>	Janice McClean		
<b>Meteor</b>			
<i>Fireball coordinator</i>		Len Entwisle	
<i>Video network coordinator</i>		William Stewart	
<i>Spectroscopy coordinator</i>		Bill Ward	
<i>Telescopic coordinator</i>		Chris Hall	
<i>Committee members</i>	Nick James, Alex Pratt, George Spalding		
<b>Aurora &amp; Noctilucent Cloud</b>			
<i>Assistant Director (Noctilucent Clouds)</i>		Ken Kennedy	
<i>Assistant Director (Geomagnetics)</i>		Ron Livesey	
<b>Variable Star</b>			
<i>Secretary</i>		Bob Dryden	
<i>Chart secretary</i>		John Toone	
<i>Binocular secretary</i>		Shaun Albrighton	
<i>Database secretary</i>		Andy Wilson	
<i>Nova/supernova secretary</i>		Guy Hurst	
<i>Eclipsing binary secretary</i>		Des Loughney	
<i>Recurrent objects coordinator</i>		Gary Poyner	
<i>Circulars editor</i>		Janet Simpson	
<i>Website manager</i>		Gary Poyner	
<b>Deep Sky</b>			
<i>Assistant Director</i>		Paul Curtis	
<i>General adviser</i>		Ron Arbour	
<i>Supernova search coordinator</i>		Guy Hurst	
<i>Remote imaging adviser</i>		Nick James	
<i>Variable nebula coordinator</i>		Mike Harlow	
<i>Double star adviser</i>		John McCue	
<b>Computing</b>			
<i>Editor of the BAA Handbook</i>		Steve Harvey	
<i>Website manager</i>		(vacant)	
<b>Historical</b>			
<i>Deputy Director</i>		Lee Macdonald	
<b>Radio Astronomy Group</b>			
<i>Treasurer</i>		John Cook	
<i>Membership Secretary</i>		Ian Williams	
<i>Editor, RAGazine</i>		Jeff Lashley	
<i>Website manager</i>		Jeff Lashley	



## Accounts for the year ended 2016 June 30

To be presented to the members of the Association at the Annual General Meeting on  
2016 October 26

### Statutory information

Name: The British Astronomical Association  
Status: Limited by Guarantee  
Registered Office: Burlington House, Piccadilly, London W1J 0DU  
Company Regn. No: 117572 Charity No: 210769

#### Directors (Trustees) from 2015 October 28 to 2016 June 30

Dr J. Shears ( <i>President</i> )	Dr N. D. Hewitt
Mrs H. W. McGee ( <i>Vice-President</i> )	Mr N. D. James
Mr A. Lorrain ( <i>Treasurer</i> )	Prof. W. Leatherbarrow
Mr W. Tarver ( <i>Secretary, Business</i> )	Dr R. J. McKim
Dr D. Boyd	

#### Directors (Trustees) from 2015 July 1 to 2015 October 28

Mrs H. W. McGee (*President*)  
Prof. W. Leatherbarrow, Dr N. D. Hewitt (*Vice-Presidents*)  
Mr A. Lorrain (*Treasurer*)  
Mr W. Tarver (*Secretary, Business*)  
Dr J. Shears (*Secretary, Papers*)  
Mrs H. Collett (*Secretary, Meetings*)

Dr P. Abel, Dr D. Arditti, Dr D. Boyd, Mr J. Chuter, Ms L. Crook, Mrs A. Davies, Mr N. D. James, Mr R. Johnson, Dr S. Moore.

Mr M. Foulkes, Mr M. Frost, Mr S. Harvey, Mr K. Kennedy, Dr J. Mason, Mr R. Marriott, Dr R. McKim, Dr R. Miles, Mr R. Pickard, Mr C. Potter, Dr J. Rogers, Mr J. Shanklin, Ms M. Smith.

### Report of the Trustees

The Trustees of the British Astronomical Association present their Report and Accounts for the financial year ended 2016 June 30.

Legal and administrative information set out above forms part of this report. The financial statements are prepared in accordance with the Financial Reporting Standards for Smaller Entities (effective 2015 January). The financial statements comply with current statutory requirements, the trust deed and the Statement of Recommended Practice – Accounting and Reporting by Charities (2015) and the Charities Act 2011.

#### Status and objectives

The British Astronomical Association was formed in 1890 and is open to all persons interested in astronomy. It is registered as a limited company, limited by guarantee. The Association is also registered as an educational charity with the Charities Commission and its objectives are as follows:

- To promote the science of astronomy and all branches of astronomical research;
- To promote the association of observers, especially the possessors of small telescopes, for mutual help, and their organisation in the work of astronomical observation;
- The circulation of current astronomical information;
- The encouragement of a popular interest in astronomy.

The trustees when making decisions have due regard to the Charities Commission public benefit guidance when exercising any powers or duties to which the guidance is relevant.

#### Officers, management and organisation

During the previous session, a major revision of the Memorandum, Articles of Association and Bylaws was approved at a Special General Meeting on 2015 May 27. The revised version became fully effective following the Annual General Meeting on 2015 October 28. Thus from the beginning of the financial year on 2015 July 1 to the AGM, the Council constituted the Trustees of the Charity and the Directors of the Company, as listed above. Council consisted of seven elected executive officers (President, two Vice-Presidents, Treasurer, three Secretaries), nine elected Council members and fourteen Section Directors.

From the AGM until the end of the financial year on 2016 June 30, in accordance with the Company's revised Memorandum and Articles of Association, the 'Board of Trustees constituted the Trustees of the Charity and the Directors of the Company' (new Articles of Association, para. 12). The Board has 'control over, and management of, all financial and administrative affairs and all property of the Association'.

The Board consists of nine Trustees (President, Vice-President, Treasurer, Business Secretary and five further members of the Association). All Trustees are elected annually by the members before the AGM, except the Vice-President who is *ex officio* the immediate past President and who serves as Vice-President for the duration of their successor's term. Trustees are normally long-standing members of the Association. The President is responsible for overall management of the operations of the Association.

The Treasurer is responsible for all finance matters, reporting quarterly to the Trustees on the Association's financial position. The Business Secretary acts as the Company Secretary and has the management of all persons employed by the Association, and the management of the correspondence of the Association, the Board of Trustees and the Council.

New Trustees are provided with induction information and training by officers as required to meet their responsibilities. The Board meets in person at least twice per year to deal with the governance and management of the Association. In addition, the Board confers on a regular basis throughout the year, via teleconference and other electronic means.

In accordance with the Company's revised Memorandum and Articles of Association, the Council now consists of the Board of Trustees, two additional Secretaries, the Section Directors and Postholders and five further members of the Association. The latter five, and the two additional Secretaries, are elected annually before the AGM. The two Secretaries deal with matters relating to scientific papers and meetings. The appointment of Section Directors and Postholders is confirmed annually by the Council.

The Council regulates and organises the scientific and public activities of the Association and the services to Members, subject to the financial and administrative control exerted by the Board of Trustees. Council meets on a regular basis at least six times per year. Section Directors are responsible for the management of their Section, reporting to the Council on all matters arising.

#### Achievements and performance

For the financial year 2015/16 the surplus of income over expenditure was £5,057 (2015: £2,234).

Membership recorded at 2015 July 31 was 2731 across all categories. On 2016 July 31, the equivalent number was 2685, a decline of 46.

The accounts show a small surplus for the year, after taking into account the receipt of significant legacies from two of our members, together with a slight increase in the valuation of our investment assets. The Board continues to review the costs of the Association, both governance and of charitable activities, in order to identify efficiencies, but will consider drawing on its reserves if necessary in the short term in order to meet our charitable objectives of promoting amateur astronomy, assisting observers in developing and publishing their work and circulating current astronomical information.

We remain indebted to those members and others who support us with their donations or by remembering the Association with a legacy.

A major development was the implementation, following the AGM, of the revised Governing Document of the Association (Memorandum, Articles of Association & By-laws). Apart from a minor date change, this had remained unchanged since 1988 and a revision was badly needed. The most significant change is the reduction of the number of trustees of the charity (and directors of the company) from an unwieldy 29 or 30 full Council members to a Board of Trustees of nine, who are now responsible for the administrative and financial management of the Association. Scientific, educational and public work remains the responsibility of the Council, which is in fact slightly increased in size as all Postholders are now also voting members.

This year Council lost the valuable and greatly appreciated services of two Section Directors and one Postholder. Jonathan Shanklin stood down as Comet Section Director after 25 years in the post and was replaced by Nick James. Ken Kennedy stood down as Aurora Section Director and was replaced by Sandra Brantingham, and Paul Hyde retired as Coordinator of the Radio Astronomy Group and was replaced by Jeff Lashley.

The Treasurer has signalled his intention to stand down in 2017 October at the end of the 2016/17 session. A search is under way for a successor.

The work of the observing Sections continues to be at the forefront of the Association's activities, which were again reported in six fully illustrated issues of our *Journal*. In addition to four meetings at Burlington House and one at UCL, members' meetings were held at the Rutherford Appleton Laboratory (Oxfordshire), Chelmsford and York, together with an Observers' Workshop on comets & meteors in London, and Back to Basics workshops at St Asaph, North Wales, and Shurdington, near Cheltenham. We also celebrated the 50th anniversary of the Winchester Weekend. Next session meetings will be held at Dundee, Edinburgh and Eastbourne, as well as in London, with a Back to Basics workshop in Chichester. At a recent Council meeting, we reviewed the location and timing of BAA meetings. In the past there was a feeling that the BAA was rather London-centric. However, whilst our headquarters are located in London, where we benefit from holding some of our meetings without charge in the RAS lecture theatre, we do strive to organise meetings around the country as much as we can.

Apart from routine office tasks almost all of this substantial programme of activities is run and managed by volunteers, and as ever we are hugely grateful to all those who so freely offer their time and expertise to support our work.

#### Plans for future periods

During the next session we intend to refresh and further develop the Association's website ([www.britastro.org](http://www.britastro.org)), which is one of the main faces of the BAA to the outside world – and for many members who are unable to attend meetings regularly, it is one of the chief ways of interacting with the Association. Our objective is that the website should be a vehicle for fostering a greater sense of community amongst members.

We are also investigating the possible adoption of a new category of membership who would subscribe to digital-only versions of the *Journal* and *Handbook* at a lower rate. Other advantages of membership, such as attending meetings and enjoying the members' content on the website, would remain. This might help us gain some new members, as well as being attractive for some existing members who are falling on hard times and otherwise might be considering resigning from the Association. There is no intention of stopping the printed *Journal* and *Handbook* – these will continue to be published and an analysis shows that maintaining printed versions should remain financially viable in the foreseeable future. We anticipate running a trial of digital membership, starting possibly with overseas members.

Apart from these projects, the Association's programme will continue as in previous years. Small changes may be made to incorporate new activities or to terminate redundant activities as the Board of Trustees or Council considers appropriate.

#### Financial review

##### Reserves policy

The reserves policy of the Charity is to retain a level of reserves which will provide an annual income sufficient to meet any operating deficit and which will also meet expenditure commitments for the next twelve months, including the distribution of awards and grants as decided by Council in accordance with any conditions applicable. The reserves held are sufficient to meet the expected expenditure for a period of at least 12 months and incorporating investment returns generated, would be sufficient to cover any deficit.

##### Risk management

Issues involving significant risk are brought before the Board on a routine basis as and when such issues arise. Where a matter is complex an appropriate working group is formed from a small number of Board or Council members to evaluate issues and formulate recommendations. An assessment of the major risks to which the Association is exposed is updated from time to time. The Association's systems of internal controls are designed to provide reasonable but not absolute assurance against material

misstatement or loss. Board members are satisfied that the systems in place mitigate exposure to major risks.

#### Investment policy

In accordance with the Memorandum and Articles of Association, the Board has the power to invest in such stocks, funds, shares, securities or other investments as it sees fit. The investment objective of the Association is to make investments which will maintain the real purchasing power of the portfolio over time and provide a level of income sufficient to meet operational needs while exposing the Association to a low level of risk. The Treasurer has identified two potential investment managers and expects to implement the Association's investment policy in conjunction with the new professional advisors shortly, once approved by the Board of Trustees.

#### Trustees' & Directors' responsibilities in the preparation of financial statements

The Trustees (who are also directors of the Charity for the purposes of company law) are responsible for preparing the Trustees' annual report and financial statements in accordance with applicable law and United Kingdom Accounting Standards (UK Generally Accepted Accounting Practice).

Company law requires the Trustees to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the charitable company and of the incoming resources and application of resources, including the income and expenditure, of the charitable company for that period.

In preparing these financial statements, the Trustees and directors are required to:

- select suitable accounting policies and then apply them consistently;
- observe the methods and principles in the Charities SORP;
- make judgements and estimates that are reasonable and prudent;
- state whether applicable UK Accounting Standards have been followed, subject to any material departures disclosed and explained in the financial statements; and
- prepare the financial statements on a going concern basis unless it is inappropriate to presume that the Charity will continue on that basis.

The Trustees are responsible for maintaining proper accounting records that disclose with reasonable accuracy at any time the financial position of the charitable company and enable them to ensure that the financial statements comply with the Companies' Act 2006. The Trustees are also responsible for safeguarding the assets of the charitable company and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Trustees are responsible for the maintenance and integrity of the corporate and financial information on the charitable company's website. Legislation in the United Kingdom governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

This report was approved by the Board on 2016 September 6.

Dr J. Shears  
President

A. K. Lorrain  
Treasurer

Members may note that in some cases, the figures given below for the 2014/15 session differ from those shown in the accounts published in the 2015 October *Journal*.

During the completion of their Independent Review, our new accountants identified certain adjustments that they believe should be made to the Accounts that were published in the *Journal* to more accurately reflect the Association's financial position from an accountancy perspective.

The result of these adjustments was to revise our net position for the 2014/15 session from the previous deficit of £5,432 to a small surplus of £2,234.

The '2015' figures reported in the accounts statements below represent the adjusted figures, and agree with the Accounts submitted to Companies' House and the Charities Commission.

## Accounting policies

### 1. Accounting conventions

The financial statements have been prepared under the historical cost convention, in accordance with the Financial Reporting Standard for Smaller Entities (effective January 2015) and in accordance with the Statement of Recommended Practice, Accounting and Reporting by Charities (SORP 2015) effective from 1 January 2015, applicable accounting standards and the Charities Act 2011. The principal accounting policies adopted in the preparation of the financial statements are as follows:

### 2. Incoming Resources

*Charitable Activities:* Income from hire charges is included in incoming resources in the period to which the hire relates.

*Investment Income:* Interest is included when receivable by the charity.

*Donations and grants:* Income from donations and grants is included in incoming resources when these are receivable. When donors specify that grants, including capital grants, are for particular restricted purposes, which do not amount to pre-conditions regarding entitlement, this income is included in incoming resources of restricted funds when receivable.

### 3. Resources expended

Liabilities are recognised as resources expended as soon as there is a legal or constructive obligation committing the charity to the expenditure.

Resources expended are included in the Statement of Financial Activities on an accruals basis, inclusive of any VAT which cannot be recovered.

Certain expenditure is directly attributable to specific activities and has been included in those cost categories. Certain other costs, which are attributable to more than one activity, are apportioned across cost categories on an estimated basis, as the amounts involved are not material.

Governance costs are those incurred in connection with the administra-

tion of the charity and compliance with constitutional and statutory requirements.

### 4. Tangible fixed assets and depreciation

Tangible fixed assets are stated at cost or valuation less depreciation and any provision for impairment. Depreciation is provided at rates calculated to write off the cost less estimated residual value of each asset over its expected useful life, as follows:

Fixtures, fittings and equipment – 6 years straight line

Instrument collection – 5% reducing balance

The charity has no de minimus capitalisation limit.

### 5. Fund accounting

Funds held by the charity are either:

*Unrestricted general funds* – these are unrestricted funds which are available for use at the discretion of the trustees in furtherance of the general objectives of the charity and which have not been designated for other purposes.

*Restricted funds* – these are funds which are to be used in accordance with specific restrictions imposed by donors. The aim and use of each fund is set out in the notes to the financial statements.

These unaudited financial statements have been subjected to independent examination. See report below.

### 6. Investments

The investments have been revalued to open market value. All unrealised gains and losses arising from the revaluations are recognised in the Statement of Financial Activities.

### 7. Going concern

No material uncertainties that may cast significant doubt about the ability of the charity to continue as a going concern have been identified by the Trustees, therefore, the accounts have been prepared on a going concern basis.

## THE BRITISH ASTRONOMICAL ASSOCIATION

### Independent Examiner's Report to the trustees of the British Astronomical Association for the year ended 2016 June 30

I report on the financial statements of the British Astronomical Association for the year ended 2016 June 30, which are set out on pages 310 to 315.

#### Respective responsibilities of Trustees and examiner

The Trustees (who are also directors of the company for the purposes of company law) are responsible for the preparation of the financial statements. The Trustees consider that an audit is not required for this year under section 144(2) of the Charities Act 2011 (the 2011 Act) and that an independent examination is needed.

Having satisfied myself that the charity is not subject to audit under company law and is eligible for independent examination, it is my responsibility to:

- examine the financial statements under section 145 of the 2011 Act;
- follow the procedures laid down in the general Directions given by the Charity Commission under section 145(5)(b) of the 2011 Act; and
- state whether particular matters have come to my attention.

#### Basis of independent examiner's report

My examination was carried out in accordance with the general Directions given by the Charity Commission. An examination includes a review of the accounting records kept by the charity and a comparison of the financial statements presented with those records. It also includes consideration of any unusual items or disclosures in the financial statements, and seeking explanations from you as Trustees concerning any such matters.

The procedures undertaken do not provide all the evidence that would be required in an audit and consequently no opinion is given as to whether the financial statements present a 'true and fair view' and the report is limited to those matters set out in the statement below.

#### Independent examiner's statement

In connection with my examination, no matter has come to my attention:

1) which gives me reasonable cause to believe that in any material respects the requirements:

- to keep accounting records in accordance with section 386 of the Companies Act 2006; and
- to prepare financial statements which accord with the accounting records and comply with the accounting requirements of section 396 of the Companies Act 2006 and with the methods and principles of the Statement of Recommended Practice: Accounting and Reporting by Charities

Have not been met; or

2) to which, in my opinion, attention should be drawn in order to enable a proper understanding of the financial statements to be reached.

**Kevin Barwick FCA**

2016 September 23

RSM UK Tax and Accounting Limited

Highfield Court, Tollgate, Chandlers Ford, Eastleigh, Hants. SO53 3TY

**Balance sheet as at 2016 June 30**

	2016		2015	
	£	£	£	£
<b>Fixed assets</b>				
Furniture & equipment	41,577		43,970	
Investments ( <i>see page xxx</i> ) – <i>General fund</i>	281,604		270,665	
– <i>Bequest &amp; other funds</i>	11,299		<u>14,195</u>	
<i>Total fixed assets</i>		334,480		328,830
<b>Current assets</b>				
Debtors	32,913		38,779	
VAT debtor	2,592		3,743	
Bank & cash balances	553,243		550,651	
Staff season-ticket loan	–		<u>829</u>	
<i>Total current assets</i>		588,748		594,002
<b>Current liabilities</b>				
Short-term creditors (trade)	290		1,070	
Taxation	–		–	
Accrued income	–		–	
Other creditors	–		732	
Net wages control	1,341		46	
Other accruals	<u>8,332</u>		<u>12,776</u>	
<i>Total current liabilities</i>		(9,963)		(14,624)
<b>Total assets less current liabilities</b>		<b>£913,265</b>		<b>£908,208</b>
<b>Capital reserves</b>				
Revaluation reserve	–		–	
Bequest funds	11,299		14,195	
General fund	896,909		891,779	
P&L account	5,057		2,234	
<b>Total funds</b>		<b>£913,265</b>		<b>£908,208</b>

For the year ending 2016 June 30 the Company was entitled to exemption from audit under section 477 of the Companies Act 2006 relating to small companies. No members have required the company to obtain an audit of its accounts for the year in question in accordance with section 476 of the Companies Act 2006. The Directors acknowledge their responsibilities for complying with the requirements of the Act with respect to accounting records and for the preparation of the accounts. These financial statements have been prepared in accordance with the provisions applicable to companies subject to the small companies' regime.

Authorised by the Board on 2016 September 6 and signed on its behalf.

J. SHEARS – *President*  
A. K. LORRAIN – *Treasurer*

**Statement of financial activities: year ended 2016 June 30**

	----- 2016 -----			---- 2015 ----
	<i>Unrestricted funds</i>	<i>Restricted funds</i>	<i>Total</i>	<i>Total</i>
	£	£	£	£
<b>Incoming resources</b>				
Charitable activities	176,425	(125)	176,300	170,181
Investment income	5,830	63	5,893	6,789
Other incoming resources	<u>234</u>	–	<u>234</u>	<u>177</u>
<b>Total incoming resources</b>	<b>£182,489</b>	<b>£(62)</b>	<b>£182,427</b>	<b>£177,147</b>
<b>Resources expended</b>				
Charitable activities	(96,027)	(2,834)	(98,861)	(103,134)
Governance costs	<u>(82,759)</u>	–	<u>(82,759)</u>	<u>(77,392)</u>
<b>Total resources expended</b>	<b>£(178,786)</b>	<b>£(2,834)</b>	<b>£(181,620)</b>	<b>£(180,526)</b>
<b>Net income/(expenditure) for year</b>	<b>£3,703</b>	<b>£(2,896)</b>	<b>£807</b>	<b>£(3,244)</b>
Revaluation gains	4,250	–	4,250	5,478
<b>Net movement in funds / Net income for year</b>	<b>£7,953</b>	<b>£(2,896)</b>	<b>£5,057</b>	<b>£2,234</b>
<b>Reconciliation of funds</b>				
Total funds brought forward	<u>894,013</u>	<u>14,195</u>	<u>908,208</u>	<u>905,974</u>
<b>Total funds carried forward</b>	<b>£901,966</b>	<b>£11,299</b>	<b>£913,265</b>	<b>£908,208</b>

The statement of financial activities includes all gains and losses in the year and therefore a separate statement of total recognised gains and losses has not been prepared. All of the above amounts relate to continuing activities.

## Fixed asset investments held at 2016 June 30

	If listed	Market value		
		2016 £	2015 £	
<b>General fund</b>				
15,744	COIF fixed interest units	Yes	22,151	20,864
760	Aviva shares	Yes	2,994	3,743
760	Merchants Trust 25p shares	Yes	3,374	3,530
960	Barclays PLC 10p ordinary shares	Yes	1,331	2,501
20,302	Aviva Investors Property Trust	No	24,290	24,643
20,448	Invesco Perpetual Corporate Bond	No	18,665	18,057
10,569	Legal & General UK Index Trust	No	15,234	15,346
47,268	M&G Corporate Bond	No	19,786	18,572
7,079	Royal London Index Linked Fund	No	17,326	15,086
25,258	Schroder Corporate Bond	No	16,059	14,978
67,120	Standard Life Select Property Fund	No	26,323	22,626
	COIF Charities Deposit Fund	No	58,740	55,528
	Julian Hodge Bank	No	55,331	55,191
<i>Total General fund</i>			£281,604	£270,665

	2016		2016 £	2015 £
	Income £	Expenditure £		
<b>Bequest and other restricted funds</b>				
COIF Charities Deposit Fund				
<i>Gaythorpe Library Bequest</i>	22	2,345	2,728	5,051
<i>Goodacre Medal and Gift</i>	19	130	4,094	4,205
<i>Merlin Medal and Gift</i>	6	140	1,367	1,501
<i>Merton Bequest</i>	8	125	1,715	1,832
<i>Horace Dall Memorial Fund</i>	8	219	1,395	1,606
<i>Total bequest and other restricted funds</i>	63	2,959	£11,299	£14,195
<b>Total funds</b>			<b>£292,903</b>	<b>£284,860</b>

All fixed asset investments are held within the United Kingdom.

## Analysis of Section expenses: year ended 2016 June 30

Members are advised that as in previous years much Section income & expenditure is included in the figures for general Meetings costs, and that the figures below do not therefore represent a complete picture.

	----- 2016 -----			2015
	Income £	Expenditure £	Net exp. £	Net exp. £
Solar	—	343	343	376
Lunar	—	—	—	89
Mercury and Venus	—	165	165	82
Mars	—	305	305	60
Asteroids and Remote Planets	—	—	—	—
Jupiter	—	—	—	—
Saturn	—	—	—	—
Comet	—	—	—	—
Meteor	352	225	(127)	679
Aurora	—	—	—	—
Variable Star	281	946	665	818
Deep Sky	—	1,157	1,157	—
Instruments and Imaging, including Instrument Collection	—	196	196	—
Computing	—	—	—	53
Historical	—	—	—	—
Radio Astronomy Group	—	—	—	78
	<u>£633</u>	<u>£3,337</u>	<u>£2,704</u>	<u>£2,235</u>



## Income and expenditure account for the year ended 2016 June 30

	----- 2016 -----			2015
	Unrestricted funds £	Restricted funds £	Total £	Total £
<b>Incoming resources</b>				
<b>Charitable activities &amp; activities for generating funds</b>				
Subscriptions & affiliation fees	95,552	(125)	95,427	105,756
Donations	2,810	–	2,810	6,558
Gift Aid	14,515	–	14,515	19,202
Circulars subscriptions	1,408	–	1,408	1,701
Advertising revenue	579	–	579	1,255
Receipts: – Winchester weekend	23,667	–	23,667	18,208
– Exhibition	–	–	–	–
– Other meetings & workshops	3,871	–	3,871	2,662
– Sections & other groups (See p.314)	633	–	633	314
– Commission for Dark Skies	157	–	157	25
Sales: – the <i>Journal</i>	1,125	–	1,125	3,348
– the <i>Handbook</i>	2,527	–	2,527	1,385
– other publications and sundry items	6,134	–	6,134	9,767
Bequests – Mr P. H. Vince	18,447	–	18,447	–
– Mr P. Foll	5,000	–	5,000	–
<i>Total incoming resources from charitable &amp; fund generating activities</i>	176,425	(125)	176,300	170,181
<b>Other incoming resources</b>				
Investment income	5,830	63	5,893	6,789
Royalties and commissions	234	–	234	177
<b>Total incoming resources</b>	<b>£182,489</b>	<b>£(62)</b>	<b>£182,427</b>	<b>£177,047</b>
<b>Resources expended: charitable activities</b>				
The <i>Journal</i> : – Printing and despatch	32,371	–	32,371	31,367
– Editorial fees and expenses	–	–	–	–
The <i>Handbook</i>	3,288	–	3,288	4,570
Circulars	–	–	–	580
Website and internet	14,304	–	14,304	14,792
Cost of sales items	5,436	–	5,436	3,937
Winchester weekend	20,628	–	20,628	19,779
Exhibition costs	2,662	–	2,662	3,745
Astrofest & IAS (IAS 2015 only)	1,874	–	1,874	2,800
Other meetings & workshops	9,473	–	9,473	10,715
Other publications	–	–	–	763
Sections and other groups (See p.314)	3,337	–	3,337	2,549
Commission for Dark Skies	1,750	–	1,750	1,500
Document collection and archive	–	2,345	2,345	2,754
Membership promotion	–	–	–	2,397
Awards and medals	865	489	1,354	350
Robotic Telescopes project	39	–	39	536
Ridley Grants	–	–	–	–
<b>Total charitable activity expenditure</b>	<b>£96,027</b>	<b>£2,834</b>	<b>£98,861</b>	<b>£103,134</b>
<b>Resources expended: governance costs</b>				
Salaries, wages & NI (including casual staff)	37,942	–	37,942	32,097
Pensions	2,126	–	2,126	1,403
Premises, office storage and insurance	16,684	–	16,684	14,754
Accountancy & payroll	6,646	–	6,646	7,149
Independent examination (2015: Audit) fee	2,250	–	2,250	3,853
IT & Database	3,887	–	3,887	3,166
Membership promotion	1,216	–	1,216	–
Telephone, postage, misc printing, stationery & sundries	5,820	–	5,280	6,762
Officers' and Council members' expenses	4,330	–	4,330	3,956
Election costs	392	–	392	656
Depreciation & impairment (furniture & equipment)	2,393	–	2,393	2,549
Exchange (gains)/ losses	(2,278)	–	(2,278)	(866)
Bank charges	1,341	–	1,341	1,778
<b>Total governance costs</b>	<b>£82,759</b>	<b>–</b>	<b>£82,759</b>	<b>£77,257</b>
<b>Total resources expended</b>	<b>£178,786</b>	<b>£2,834</b>	<b>£181,620</b>	<b>£180,391</b>
<b>Net incoming (outgoing) resources for the year</b>	<b>£3,703</b>	<b>£(2,896)</b>	<b>£807</b>	<b>£(3,244)</b>
Revaluation of investment assets	4,250	–	4,250	5,478
<b>Net surplus (deficit) for the year</b>	<b>£7,953</b>	<b>£(2,896)</b>	<b>£5,057</b>	<b>£2,234</b>