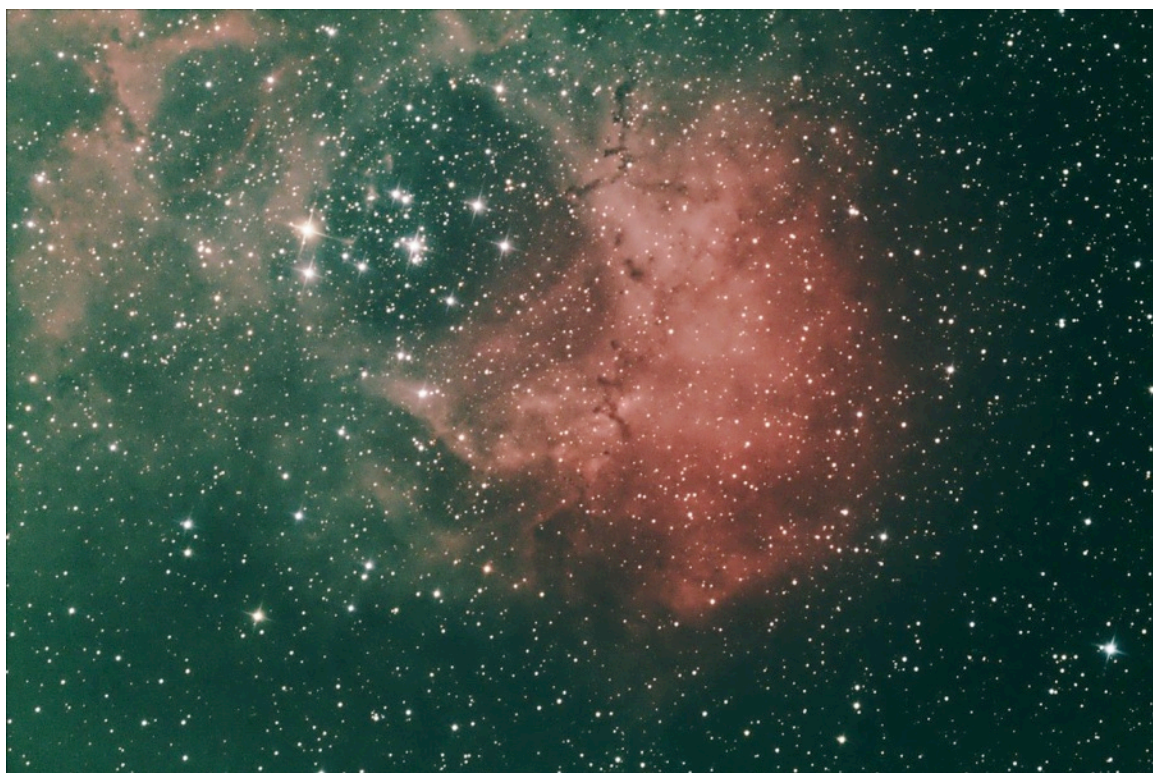




OASI News

The newsletter of the Orwell Astronomical Society



NGC2237 + Rosette nebula

Photo by David Murton, taken on 1 January,

Skywatcher 200PDS and Canon 60Da camera. 4x360sec, ISO400

Trustees:

Mr Roy Adams

Mr David Brown

Mr David Payne

Honorary President:

Dr Allan Chapman D.Phil MA FRAS

OASI Beginner's astrophotography Workshop

Date: A Newbourne OASI meeting night in the spring, actual date to be decided depending upon clear nights! Please let me have an email address to contact when a date is set. [Oasi_chairman@outlook .com](mailto:Oasi_chairman@outlook.com)

Venue: Newbourne village Hall

Equipment required: A camera, lens and method of support (normal fixed tripod, bean bag, rolled up coat, etc).

Format: A short talk on the basics, then a practical session outside with guidance from myself and Mike O'Mahony.

Who is it aimed at: Anyone who thinks that photographing the night sky is difficult or requires specialist equipment.

Following on from this workshop I will be holding a competition for the best night sky image taken between the workshop and 1st October. The competition will be judged by myself and two other judges.

It will be open to any OASI member using just a camera and lens on a fixed mount. No tracking mounts! (We will be able to check using the data embedded in the picture!)

First prize will be the opportunity to use the equipment in my observatory for a night next winter to take your own photos.

David Murton

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Society Contact details

Observatory (meeting nights only)
07967 519249

Email queries: info@oasi.org.uk

Facebook: <https://www.facebook.com/groups/445056098989371/>

Twitter: @OASlpswich

The OASI Forum has been decommissioned as usage had dwindled to just one contributor

The OASI Facebook pages are now proving very popular. Several non-members are active contributors.

Please send material for the OASI web site and newsletter

e.g. observations, notices of events, general interest articles, to

news@oasi.org.uk

Other contact details will be issued to members on a separate printed list or emailed directly to those who only receive the e-version of the News.

Access into the School Grounds and Observatory Tower

Please use the third gate into the school grounds by the gym.

Areas out of Bounds

Access to the Observatory is **only via the black door** at the foot of the Observatory tower, which leads to the staircase and thence to the spiral staircase up to the Observatory. If the black door is locked, please phone the observatory mobile, 07967 519249 during meeting hours.

Please do NOT explore other routes. When in doubt, ask or call the Observatory mobile.

Remember this is a school and straying into the main part of the school where the pupils reside would cause the society big problems and could see us losing the use of the observatory. Any member found to be anywhere other than the approved access route or the observatory area will face serious sanctions up to and including expulsion from OASI.

Please note that access time for all observatory member nights is now after 20:15

The key to the toilets in the school gym is located in the seating area in the Belvedere room.

Articles for OASI News

News, pictures and articles for this newsletter are always welcome. Please send them to news@oasi.org.uk

The CLOSING date is the 15th day of the month

Please submit your articles in any of the following formats:–

Text: txt, rtf, rtf, doc, docx, odt, Pages, pdf

Spreadsheets: xls, xlsx, OpenOffice/LibreOffice, Numbers

Images: tiff, png, jpg

Please send tables as separate files in one of the above formats.

If you don't feel up to writing a major article, perhaps you might write a short note for OASI News along the lines of *"This month I have mostly been observing/constructing/mending/reading/etc."*?

Articles win points! See page 23.

The full colour version is available from the OASI web site.

[Newsletter archive](http://www.oasi.org.uk/NL/NL_form.shtml) www.oasi.org.uk/NL/NL_form.shtml

Authors, please note that your articles will now be publicly available worldwide!

Reproducing articles from OASI News

If you plan to reproduce an article exactly as per OASI News then please contact the [Editor](#) – otherwise, as a matter of courtesy, please seek permission from and credit the original source/author. You may not reproduce articles for profit or other commercial purpose.

Committee 2016

Chairman	David Murton	Set overall agenda for OASI, Chair committee meetings, Press and publicity, Public appreciation of astronomy, Outreach activities.
Secretary	Roy Gooding	Outreach meetings (jointly with Chairman), observatory decoration.
Treasurer	Paul Whiting FRAS	Finance, Supervision of applications for grants, Visits by outside groups, Observatory tours, Public appreciation of astronomy (jointly with Chairman).
Committee	James Appleton	Committee meeting minutes, Web site
	Martin Cook	Membership, Tomline refractor maintenance & user testing
	Peter Richards	Lecture meetings, Email distribution lists
	Martin Richmond-Hardy	Newsletter
	John Wainwright	Equipment curator
	Mike Whybray	Astronomy Workshops, Child protection officer, Orwell Park School Astronomy Club.
	Avtar Nagra	Newbourne Observing Group
	Matt Leeks	Safety & security
Co-opted	Andy Willshire	Librarian

Society Notices

Contacts

A printed list of Committee and other activity contacts is available from the Secretary or the Observatory. Email links are available in the A4 pdf version of this newsletter.

For general enquiries please email info@oasi.org.uk and your enquiry will be forwarded for action.

Next Committee Meeting

22 February.

Annual General Meeting

Saturday 30 January 2016, 8pm at Museum St Methodist Church Hall.

Signing in and out

Please ensure you sign in and out when visiting the Observatory and/or Newbourne. This is for fire safety precautions and also provides an historic record.

Membership Renewal was due on January 1st

Subscription rate remains at £20 for the year which includes immediate family.

Please return the form, sent out by me in January, with subscription and any amendments necessary as instructed on the reverse of the form.

Martin Cook, Membership Secretary

OASI and BAA Events

For the latest event details, please see www.oasi.org.uk/Events/Events.shtml

There's a Google Calendar on the OASI web site with the latest dates (and corrections!). If you want to easily add OASI Events to your own computer/phone/tablet calendar application click this button on the website Events page



[Download the OASI 2016 year planner](#) from the web site. An A3 printer is advised.

For other astronomy news and astro pictures try our

Twitter feed <https://twitter.com/OASIpSwich>

Facebook page <https://www.facebook.com/pages/Orwell-Astronomical/158256464287623>

Subscribe to the OASI Yahoo group by emailing oasi-subscribe@yahoogroups.com

Date and Time	Location	Contact	Event
Weekly, every Wednesday, 20:15	Orwell Park Observatory	Martin Cook , Roy Gooding	General observation (weather permitting) using a variety of telescopes.
Saturday 27 February	Rugby	https://britastro.org	BAA Deep Sky Section meeting
Tuesday 01 March 20:15	Orwell Park Observatory	ston@oasi.org.uk	STON: Small Telescope Observing Night
Saturday 05 March	Cheltenham	https://britastro.org	BAA Back to Basics Workshop
Saturday 12 March 19:00 to 21:00	Holywells Park	Roy Gooding	Public Star Party See page 9 for details
Monday 14 March From 19:00 Workshop 20:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group Workshop: Gravity Waves & Black Holes
Tuesday 15 March 20:15	Orwell Park Observatory	Paul Whiting FRAS treasurer@oasi.org.uk	Public access event. Observatory tour. Places must be booked. Further info and book a place.
Saturday 19 March 19:00 - 22:00	Nowton Park, Bury St Edmunds	David Murton chairman@oasi.org.uk	Public access event. Star party. Book a place via the West Suffolk website . See p9.
Saturday 19 March, 10:00 - 17:30	Northampton	https://britastro.org	BAA Variable Star Section Meeting
Monday 28 March From 19:00 Workshop 20:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group Workshop: Solar Eclipse March 2016 Reports
Wednesday 30 March, 17:30 - 20:00	Burlington House, LONDON W1J 0DU	https://britastro.org	BAA Ordinary Meeting & Special General Meeting
Friday - Sunday 1-3 April	Sparsholt College, Winchester SO21 2NF	https://britastro.org	BAA Winchester Weekend

Date and Time	Location	Contact	Event
Tuesday 05 April 20:15	Orwell Park Observatory	Paul Whiting FRAS treasurer@oasi.org.uk	Public access event. Observatory tour. Places must be booked. Further info and book a place.
Monday 11 April From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Monday 25 April From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Saturday 30 April, 10:00 - 17:30	Broomfield, Nr Chelmsford	https://britastro.org	BAA One Day Spring Meeting
Monday 09 May, 11:00	Orwell Park Observatory	Martin Cook membership@oasi.org.uk James Appleton info@oasi.org.uk	Observation of the Transit of Mercury
Monday 16 May From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Saturday 21 May	Quaker Meeting House, Liverpool	https://britastro.org	BAA Historical Section Meeting
Sat 21 May 11:00-16:00	Christchurch Park, Reg Driver Centre	Roy Gooding secretary@oasi.org.uk	Public access event. Observing the sun safely. (Will postpone to 28 May if weather unsuitable.) Booking not necessary.
Sun 22 May 11:00-16:00	Christchurch Park, Reg Driver Centre	Roy Gooding secretary@oasi.org.uk	Public access event. Observing the sun safely. (Will postpone to 29 May if weather unsuitable.) Booking not necessary.
Wednesday 25 May	Burlington House, LONDON W1J 0DU	https://britastro.org	BAA Ordinary Meeting & George Alcock Memorial Lecture
Monday 13 June From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Saturday 18 June, 10:00 - 17:30	Institute of Astronomy, Cambridge	https://britastro.org	BAA Webb Deep Sky Society AGM
Sunday 19 June			Graze Hydaun1
Monday 27 June From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Saturday 02 July 11:00	York	https://britastro.org	BAA Summer Meeting
Sun 10 July Time TBC	Felixstowe Leisure Centre	David Murton chairman@oasi.org.uk	Public access event. Observing the sun safely. Booking not necessary. (If weather is poor, will reschedule to 17 July.)
Monday 11 July From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Monday 25 July From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group

Date and Time	Location	Contact	Event
Monday 08 August From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Monday 22 August From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Friday-Sunday 9 -11 September	Dundee	https://britastro.org	BAA Autumn Weekend Meeting <i>Stars: Theory, Physics and Effects.</i>
Friday - Sunday 9 -11 September	Horncastle, Lincolnshire	https://britastro.org	Horncastle Astronomy Weekend
Monday 19 Sept, 23:30	TBA	James Appleton info@oasi.org.uk	Field trip to observe graze of 87 Cet. More info.
Saturday 24 Sept, 10:00 - 17:30	Burlington House, LONDON W1J 0DU	https://britastro.org	BAA Observers' Workshop Asteroids & Remote Planets
Monday 03 October From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Saturday 08 October	Nowton Park, Bury St Edmunds	David Murton chairman@oasi.org.uk	Public access event. Star party to mark International Observe The Moon Night . Book a place via the West Suffolk website .
Friday 14 October 20:00	Methodist Church Hall Black Horse Lane, Ipswich	Pete Richards lectures@oasi.org.uk	Lecture Meeting. Roger Pickard (Director of Variable Star Section of the BAA), <i>Why Observe Variable Stars?</i>
Saturday 15 October	Chichester	https://britastro.org	BAA Back to Basics Workshop
Monday 17 October From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Friday 21 October 23:30	TBA	James Appleton info@oasi.org.uk	Field trip to observe graze of 20 Gem or 21 Gem. More info.
Wednesday 26 October, 17:30 - 20:00	Burlington House, LONDON W1J 0DU	https://britastro.org	BAA Annual General Meeting
Monday 31 October From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Monday 14 November From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Monday 28 November From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Monday 12 December From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Wednesday 14 Dec	TBD but probably The Newbourne Fox.	Roy Gooding secretary@oasi.org.uk	Christmas Meal.
Monday 22 December 06:36	TBA	James Appleton info@oasi.org.uk	Field trip to observe graze of Hipparcos 63099. More info.

Public Star Parties organised by OASI in 2016

Stargazing Live in Christchurch Park 16 January

Well, the Suffolk weather gods did it again last night and conspired to wheel in the clouds, in spite of an earlier good weather forecast.

Thanks to everyone who helped on the night at Christchurch park. Considering the weather, it went off well, with much interest from the visitors.

David Murton

Nowton Park Star Party – Saturday 19 March

<https://www.whatsonwestsuffolk.co.uk/whats-on/event/2794/the-nowton-park-star-party>

We'll be situated in the heart of Nowton Park, well away from light sources to maximise our chance of viewing at stars.

- This event is suitable for adults and children of all ages
- All children must be accompanied by an adult
- As part of the booking process you will be asked the age of the participant/s & for an emergency contact telephone number
- Please wear suitable outdoor clothing
- The event will still go ahead in unfavourable conditions, but with a longer talk and a display of telescopes as an alternative.
- The talk will start promptly at 7:15pm

Meet at The Walled Garden, Nowton Park. Please park in the main Nowton Park car park and follow the guided path to the Walled Garden.

Times: 7pm-10pm, Saturday 19 March & Saturday 8 October

Tickets: £5 adults / £3 children. Booking essential

Venue: Nowton Park, Bury St Edmunds

This event is promoted by West Suffolk Parks

Holywells Park, Saturday 12th March 19:00 to 21:00

This event is part of [British Science Week](#) (March 11th to 20th)

Entrance: Myrtle Road gate. The gate will be manned by a park ranger who will open the gate from about 18:00 for us to set up equipment. Myrtle Road is one way, so approach the gate from the roundabout at the Duke Street end. Set up on the same grass area as used for the Family day event. This area is about 150 yards in from the gate on the right hand side of the path. Visitors have been asked to meet at the Myrtle road gate from 18:45 to 19:15. The gate will be closed after this time.

The Parks Department have produced a poster for the event.

A4 posters will be distributed to the town parks, for their display boards and the Tourist Information Office.



A5 posters will be available at the coffee shop in Holywells park, the Reg Driver Centre in Christchurch park and the Tourist Information Office.

The Holywells Park events web page <https://www.ipswich.gov.uk/content/hlf-events> and their social media site will include this event.

Roy will contact the park reception on the Saturday morning if it is go or no go.

The poster asks visitors to phone the park reception 01473 433990 to confirm the event is on.

Christchurch Park Star Party Saturday & Sunday 21, 22 May

Solar Observing Felixstowe Leisure Centre Sunday 10 July

Public access event. Observing the sun safely. Booking not necessary. If weather is poor, will reschedule to 17 July.

International Sun Day 26 June

TBA

Debenham

There will be no event at Debenham this year. [*Bound to be a sunny day. Ed.*]

Bentley Family Day

The provisional date is Sunday 4th September.

Nowton Park Star Party – Saturday 8 October

<https://www.whatsonwestsuffolk.co.uk/whats-on/event/2794/the-nowton-park-star-party>

International Observe the Moon night (InOMN) is an annual worldwide public event that encourages observation, appreciation, and understanding of our Moon and its connection to NASA planetary science and exploration. Everyone on Earth is invited to join the celebration by hosting or attending an InOMN event — and uniting on one day each year to look at and learn about the Moon together.

The moon will be waxing gibbous on the night and become a Supermoon on 16 October.

Other Star Parties that OASI members may be attending

Haw Wood Star Party Friday – Sunday 4–7 March and 28–31 October

Haw Wood is a [Dark Sky Discovery](#) site. Naked eye visibility is magnitude 5.73; with averted vision, 5.99; best SQM reading 21.75.

Haw Wood Farm Caravans and Camping

[Haw Wood Farm](#)

Hinton

Saxmundham IP17 3QT

Kelling Heath Star Party – 8–10 April and 30 Sept – 2 Oct

The Spring Star Party at Kelling Heath is organised by the Norwich Astronomical Society. The star party was initially purely an observing event aimed more at the experienced observer. However it is gaining popularity with over 200 pitches booked at the 2015 event and a number of trade stands present.

Whether you are a veteran of the star party and looking forward to meeting up with old friends or a total newcomer, you will find this event a welcoming and fun way to enjoy the dark skies that North Norfolk has to offer.

See <http://www.starparty.org> for the Spring Star Party

See <http://starparty.las-astro.org.uk/index.php> for the Autumn Equinox Sky Camp.

Newbourne Observing Group

Avtar Nagra nog@oasi.org.uk

We normally meet at Newbourne Village Hall, Mill Lane, IP12 4NP

The Newbourne Observing Group (The NOGs) is a good place to start for beginners. If you are thinking of buying a scope or binoculars, come and try before you buy and talk to owners about the strengths and weaknesses of particular models. If you've already splashed the cash, bring your new scope along to use or for advice on setting-up and adjustment. All welcome, with or without telescopes.

NOG Meetings in 2016

Please note there is only 1 meeting in May because of Bank holidays.

14 March (W)	28 March (W)	11 April	25 April
16 May	13 June	27 June	
11 & 25 July	8 & 22 August	5 & 19 Sept	
3, 17 & 31 Oct	14 & 28 Nov	12 & 19 Dec	

We open up for all meetings at 7pm. Workshops (W) start at 8pm.

Please check the web site diary for any changes during the year.

Newbourne Observation Group Report to OASI AGM Jan 2016

Avtar Nagra

There were 25 meetings at Newbourne village hall and 1 at Clopton village Hall in the last year. Newbourne has attracted more visitors recently and we have managed to get most to join OASI. On average there are about 20 members attending the meetings. The summer month meetings have had good attendances despite the light nights.

This year the Christmas meeting was held at Clopton to coincide with the graze and also to check out the facilities (dark skies). Unfortunately the weather was not favourable for the graze or viewing.

Newbourne has been successfully used for hosting the workshops this year (see Mike Whybray's report).

A number of members attend only Newbourne meetings and don't visit the observatory. This means that the library at the observatory is underused. A new "mobile lending library" facility will be starting next month at Newbourne. Members will be able to borrow books for up to 4 weeks. Members will be required to present their membership card in order to borrow the books.

The parish council are planning to create a hard surface parking area to alleviate the problem of cars getting stuck in the soft ground in wet weather.

Thanks to all the members for helping in the setting up and clearing on club nights.

Astronomy Workshops

Contact Mike Whybray

Location: Newbourne Village Hall IP12 4NP

Doors open at 7:00pm.

Workshops start at 8:00pm

If you are a new OASI member, or haven't been to one of these informal workshops before, they are a mixture of events of different characters including beginners talks, interactive workshops, films, etc., suitable for all. They are also a chance to chat with other members over a cup of tea and a biscuit, in a venue rather warmer than the observatory dome on a winter's night!

Newbourne Village Hall is our new location for occasional workshops, which will be held on dates booked for normal NOG (Newbourne Observing Group) meetings. If you aren't interested in the workshop you can still just use the hall facilities and the field for observing – but please be quiet so as not to disturb the workshop!

Given a clear night, we can make use of the field for a workshop or continue afterwards with some observing – something not possible at the previous venue, Nacton village hall.

Do you have a subject you could workshop? You could do a short one, or share the effort with a partner. Drop Mike Whybray a line! workshops@oasi.org.uk

14th March 8pm: Gravity Waves and Black Holes

Following the announcement on 11th February that the LIGO instrument had made the first ever detection of a gravitational wave, now seems a good moment to look at what these waves are and how they were detected. I'll also give a brief introduction to the Theory of General Relativity, have a look at the details of the detection results, and consider what we can expect next. I'll try and make some practical demonstrations - but not involving actual black holes! Mike Whybray

28th March 8pm: Solar Eclipse March 2016 Reports

There will be a total solar eclipse on 9th March which Paul Whiting will be observing, and probably other members of OASI. Paul will present his own experiences of the event, and any other members who went are also welcome to show and talk about their experience, either informally on the night, or contacting Mike Whybray or Paul Whiting in advance to co-ordinate input to the workshop.

Workshops and Orwell Park School Astronomy Club Report to OASI AGM Jan 2016

Mike Whybray

Workshops

There have been seven workshops since the last AGM:

28 January 2015 *The Rosetta Mission to Comet 67P/Churyumov-Gerasimenko*. Mike Whybray

04 March 2015 *A Comet's Tale*. Neil Norman

11 March 2015 *Checking and Adjusting Binocular Alignment*. Mike Whybray & Ray Larsen

01 April 2015 *Observations of the solar eclipse of 20 March 2015*. Paul Whiting & Bill Barton

28 September 2015 *Building A Home Observatory*. David Murton

26 October 2015 *CERN: Accelerating Science*. Charlie Green

11th January 2016 *New Horizons of Pluto*. Paul Whiting

Starting from September 2015, all the workshops are now being run at Newbourne village hall on NOG nights (Mondays) to add variety to NOG evenings, and also because observing from Nacton Village Hall is almost impossible. Numbers attending varies but the last two were particularly popular with well over 30 people at each.

I hope to have someone from the East Anglian Rocket Society run a workshop on rockets in the Spring, but am generally still in need of more OASI members to come up with ideas for workshops, and to run them please! Teaming up with someone to share the load, or offering a short workshop to be paired with another one on the same night are good options to consider.

Orwell Park School Astronomy Club

OASI volunteers run this club for children at Orwell Park School 6:45 to 7:45pm on Tuesdays in term time during the winter and spring, but only if there is a good prospect of clear skies. Normal attendance is about a dozen children from the school - usually a mix of new children and ones who have been up to the observatory before.

We normally run with Paul Whiting & Bill Barton, and myself & Eric Sims as teams, but would welcome anyone else who would like to volunteer to help. However, everyone assisting at these events needs to have a current DBS or CRB check (which OASI can help arrange).

I have recently installed a shelf in one of the observatory dome alcoves which allows the laptop and projector to be used to project star maps, slides etc. onto a screen hung from the telescope. This can be used to introduce what the children will be seeing.

Thank you to all who help with the workshops and the school astronomy activities.

Mike Whybray. 28th January 2016

Small Telescope Observing Nights (STONs)

Contact: Paddy O'Sullivan and Dave Robinson Email: ston@oasi.org.uk

These evenings enable members to gain hands-on experience of using the society's telescopes and to practice locating astronomical objects. They are organised by Paddy O'Sullivan and David Robinson and currently take place at Orwell Park Observatory. They are held on the first Tuesday of the month, starting at 20:15, *but only when there is a demand from members*. To ensure there will be an organiser in attendance, members should email the above address.

If members cannot gain access due to lack of Fob, etc., please ring the observatory telephone number **07967 519249**.

Lecture Meetings

Contact: Peter Richards

These take place in Museum Street Methodist Halls, Upstairs room, Black Horse Lane, Ipswich

There is some parking at the venue but if there is no space at the venue you can drive to the end of Black Horse Lane and turn left to find a pay and display car park which charges (at the time of writing) £2 for parking between 6pm and 6am. There is also the spiral car park by the New Wolsey theatre

Friday 14 October: Roger Pickard "Why observe variable stars?"

Roger is director of the variable stars section of the BAA.

DASH Astro Events – 2016

See <http://dash.moonfruit.co.uk> for the latest details.

All DASH Astro observing sessions will take place at WESTLETON COMMON. ASOG observing sessions and locations may be arranged at the time of observation.

Unless stated all group meetings will take place at WESTLETON VILLAGE HALL from 7:30 pm

Observing sessions:

Nights: 5 March, 2 & 30 April,
4 June, 1 & 29 Oct, 26 Nov

Solar observing: 2 July, 6 Aug, 3 Sept

Date	Event
19 March	Bob Greef (BAS) - An introduction to astrobiology.

16 April	Dave Murton - Beginners' guide to night sky Naked eye observations
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BAA One Day Spring Meeting

Robotic exploration of the Solar System

Venue: Chelmer Valley High School, Chelmsford, Essex, CM1 7ER (click to see map)

Date: Saturday, 2016, April 30 - 10:00 to 18:00



We are living in a golden age of Solar System exploration. In 2015 the New Horizons spacecraft flew past Pluto, Rosetta continued its extraordinary exploration of comet 67P, there are rovers and orbiters exploring Mars, the Cassini spacecraft is still making its audacious tour of the Saturnian system and Dawn is in orbit around Ceres. All of these missions and more are returning amazing data. In 2016 we will see many other exciting developments including a planned "landing" of Rosetta on its comet, the Grand Finale of Cassini, the launch of the first of Europe's Exomars spacecraft and NASA's Juno arriving at Jupiter. Many other missions are planned.

With the rapid evolution of the Internet amateurs can follow these missions in greater detail than ever before and can even participate in generating science, both through analysing data products from the spacecraft and through supporting observations from the ground. The objective of this meeting is to discuss current and future mission plans and how amateurs can play a part.

Doors open at 09:30 for registration with the programme getting underway at 10:15.

The complete programme is:

- Dr. Jeremy Shears (BAA President) - Introduction and welcome
- Prof. Mark McCaughrean (ESA) - ESA's Solar System exploration programme
- James Canvin - Amateur use of Solar System spacecraft data
- James Hannan - An introduction to the NEAS
- Dr. Geraint Jones (MSSL/UCL) - The ESA JUICE mission to the icy moons of Jupiter
- David Morris (e2V) - Designing cameras for deep space missions
- Nick James - Ground-based amateur observation in support of planetary missions
- Dr. John Mason - New Horizons, science at the edge of the Solar System

This is a joint meeting with our hosts, the [North Essex Astronomical Society](#) and it will take place at Chelmer Valley High School, Chelmsford, Essex, CM1 7ER. The city of Chelmsford is closely associated with these missions, from developing on-board cameras to providing ground station systems. The school has its own observatory which should allow us to observe the Sun if it is clear. Chelmsford railway station has frequent trains from London, Liverpool Street and buses run from the station to within a short walk of the venue. There is parking on site.

The entry cost is £3 (members of the BAA/NEAS and affiliated societies¹), £5 (non-members) and £2 (accompanied children under 16). This includes tea and coffee. An optional buffet lunch is available for £9 if booked in advance.

Booking information

Advance booking is recommended for this meeting. Booking will close on 2016 April 20.

- Booking through the [BAA online shop](#).
- Printing out our [Broomfield Booking.pdf](#) and return it to the BAA office before 2016 April 20.
- Contacting the BAA office on 0207 734 4145 (staffed 9am to 5pm, Mon-Fri).

¹ OASI is affiliated to the BAA

The Night Sky in March

Martin RH

All event times given are GMT (UTC) for the location of Orwell Park Observatory
52.0096°N, 1.2305°E

Moon

Source: <http://heavens-above.com/moon.aspx>

Full Moon	Last Quarter	New Moon	1st Quarter
23 March 12:01	01 March 23:11	09 March 01:55	15 March 17:03
	31 March 16:17		

Sun, Moon and planets

Source: <http://heavens-above.com/PlanetSummary.aspx>

British SummerTime (BST) begins on 27 March. Times after that date are BST.

Times safely after sunset / before sunrise are shown with a grey background.

Object	Date	Rise	Set	Mag.	Notes
Sun	1	06:40	17:35		Spring equinox March 20, 04:30
	31	06:32	19:28		
Moon	1	00:38	10:05		
	31	02:17	11:14		
Mercury	1	06:26	15:39	-0.2	Mercury is at superior conjunction on 2016-Mar-23
	31	06:51	20:09	-1.5	
Venus	1	06:02	15:02	-3.7	Venus is at aphelion on 2016-Mar-20
	31	06:17	17:36	-3.8	
Mars	1	00:42	09:20	0.3	
	31	00:36	08:45	-0.4	
Jupiter	1	18:07	07:08	-2.3	Jupiter is at opposition on 2016-Mar-08
	31	16:48	06:04	-2.3	
Saturn	1	02:14	10:18	1.2	
	31	01:18	09:22	1.1	
Uranus	1	07:51	20:56	5.9	
	31	06:56	20:07	5.9	
Neptune	1	06:48	17:15	8.0	
	31	05:52	16:23	8.0	

Meteor Showers

None this month.

Occultations during March 2016

James Appleton

The table lists lunar occultations which occur during the month under favourable circumstances. The data relates to Orwell Park Observatory, but will be similar at nearby locations.

Date	Time (UT)	D/R	Lunar Phase	Sun Alt(°)	Star Alt(°)	Mag	Star
11 Mar	19:33:23	D	0.10+	-16	15	7.4	ZC 281
14 Mar	22:45:11	D	0.41+	-37	18	7.2	Tycho 1280-0697-1
14 Mar	22:54:04	D	0.41+	-38	17	7.1	Hip 22846
14 Mar	23:24:00	D	0.41+	-39	13	7.3	Hip 22990
15 Mar	20:11:45	D	0.51+	-20	48	5.5	130 Tau
15 Mar	20:42:26	D	0.51+	-25	44	7.3	Hip 27428
15 Mar	23:49:02	D	0.53+	-40	18	7.3	ZC 896
16 Mar	19:10:59	D	0.62+	-11	56	5.2	26 Gem

Visible ISS passes $\geq 15^\circ$ max altitude

Martin RH

Source: <http://heavens-above.com/PassSummary.aspx?satid=25544>

Apart from a low evening pass on 31 March, all are very early morning passes this month.

NB predictions are approximate due to craft adjustments. Check the day before.

Date	Mag	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
07 Mar	-1.0	05:46:16	10°	SSW	05:48:51	22°	SE	05:51:25	10°	E
09 Mar	-1.9	05:35:21	10°	SW	05:38:22	35°	SSE	05:41:23	10°	E
10 Mar	-1.4	04:43:19	15°	SSW	04:45:08	24°	SSE	04:47:50	10°	E
11 Mar	-0.9	03:52:08	16°	SE	03:52:08	16°	SE	03:54:01	10°	ESE
11 Mar	-2.8	05:24:43	10°	WSW	05:27:51	53°	SSE	05:31:04	10°	E
12 Mar	-2.3	04:33:26	28°	SSW	04:34:31	38°	SSE	04:37:35	10°	E
13 Mar	-1.3	03:42:05	23°	ESE	03:42:05	23°	ESE	03:44:00	10°	E
13 Mar	-3.2	05:14:39	15°	WSW	05:17:19	72°	SSE	05:20:35	10°	E
14 Mar	-3.0	04:23:13	45°	SSW	04:23:52	56°	SSE	04:27:06	10°	E
15 Mar	-1.4	03:31:44	27°	ESE	03:31:44	27°	ESE	03:33:33	10°	E
15 Mar	-3.4	05:04:18	17°	W	05:06:42	85°	S	05:09:59	10°	E
16 Mar	-3.4	04:12:46	63°	SW	04:13:11	75°	S	04:16:26	10°	E
17 Mar	-1.3	03:21:13	27°	E	03:21:13	27°	E	03:22:53	10°	E
17 Mar	-3.4	04:53:47	19°	W	04:56:00	85°	S	04:59:16	10°	E
18 Mar	-3.5	04:02:12	76°	WSW	04:02:25	86°	S	04:05:42	10°	E
19 Mar	-1.1	03:10:36	24°	E	03:10:36	24°	E	03:12:05	10°	E
19 Mar	-3.4	04:43:10	21°	W	04:45:11	75°	S	04:48:27	10°	ESE
20 Mar	-3.5	03:51:34	84°	S	03:51:34	84°	S	03:54:50	10°	E

Date	Mag	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
21 Mar	-0.9	03:00:00	20°	E	03:00:00	20°	E	03:01:10	10°	E
21 Mar	-3.2	04:32:34	25°	W	04:34:13	56°	SSW	04:37:26	10°	ESE
22 Mar	-3.0	03:41:03	59°	SE	03:41:03	59°	SE	03:43:49	10°	ESE
22 Mar	-2.1	05:13:53	10°	W	05:16:40	26°	SSW	05:19:25	10°	SSE
23 Mar	-2.7	04:22:09	30°	WSW	04:23:06	37°	SSW	04:26:09	10°	SE
24 Mar	-1.9	03:30:47	29°	SE	03:30:47	29°	SE	03:32:38	10°	ESE
24 Mar	-1.5	05:03:22	10°	WSW	05:05:19	16°	SW	05:07:21	10°	S
25 Mar	-2.0	04:12:08	23°	SSW	04:12:08	23°	SSW	04:14:28	10°	SSE
31 Mar	-1.7	21:16:11	10°	SSW	21:17:47	21°	S	21:17:47	21°	S

There's an app for that: Try [ISS Spotter](#) for iPad/iPhone, which alerts you to impending passes of the ISS. For Android-based phones/tablets there's [ISS Detector](#). If you use Twitter @twisst or @ISS_spotter will send you a tweet when the ISS will be visible at your location.

Iridium flares

Too many to list but see [Iridium Flares http://heavens-above.com/IridiumFlares.aspx](http://heavens-above.com/IridiumFlares.aspx)

Paul's Astronomy Podcast for March

Paul Whiting FRAS

Podcast, Mar 2016 www.oasi.org.uk/2016_03_pod.mp3

Out of Focus Images

Bill Barton, FRAS.

We often say that looking at star images through a telescope doesn't tell you anything because the stars are so far removed from us they only ever appear as points of light no matter how much magnification you pile on. On the other hand an out of focus image can often tell you a great deal about the optical system you are looking through. When looking at an out of focus, reasonably bright star the image will appear as set of 'onion rings' and the relative brightness, spacing, and more particularly shape tell you a lot about the telescope's optical performance. The rings should appear thinner and fainter the further they are from the central 'disc'.

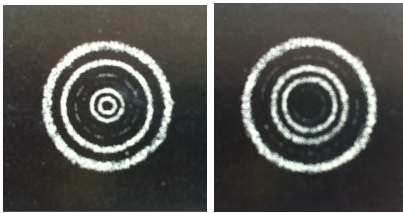
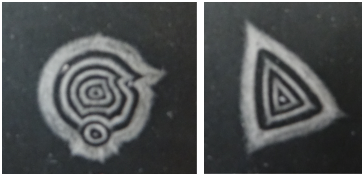
Errors can include:-

Flaring	Mis-shaping	Barring
Missing rings	Central obscuration	

As described above central star image is not that of the star itself, but is a spurious imaged named 'The Airy Disk' after Sir George Airy, Seventh Astronomy Royal who published a mathematical discussion paper in the 'Transactions of the Cambridge Philosophical Society' on the subject in 1835. By the way, the apparent size of this disk is inversely proportional to the aperture of the telescope (i.e. as the aperture increases, the disk decreases). Indeed, early telescope users thought they could actually measure the size of stars by measuring the size of these discs, but when results were more related to aperture size rather than consistency this fallacy was highlighted.

Note: Short focal ratio telescopes can suffer from 'coma' where star images close to the edge of the field of view appear distorted. The clue as to whether you are experiencing this or not is that the image distortion is radial in fashion and images on opposite ends of a diameter are distorted

in opposite directions. This is not a defect as such and can be overcome with a 'coma corrector' lens.

The telescope should be allowed to acclimatise for a minimum of half an hour before testing		
A star at, or near, the zenith should be chosen, this will overcome atmospheric distortion		
Use an eyepiece that produces a magnification of approx 40x per inch of aperture (1.4x per mm of aperture)		
Test For:	Description	Example
Gross Misalignment	Diffraction rings displaced to one side	
Minor Misalignment		
Astigmatism	Central disc is oval rather than circular, axis changes either side of focus #	
Zonal Aberration	Diffraction rings of inconsistent brightness	
Mechanical strain	Distorted diffraction rings	
Objective not adequately supported	Diffraction rings appear in sectors	
Correct figure of lens and adjustment	Tiny central disc surrounded by perfectly circular rings of diminishing brightness	

- # Astigmatism can come from the objective, the eyepiece or, indeed, the observers eye. Rotating the eye (by twisting your head), or eyepiece will confirm if the cause is not the objective.

NSF's LIGO Has Detected Gravitational Waves

On 11 February the National Science Foundation (NSF) announced the detection of gravitational waves by the [Laser Interferometer Gravitational-Wave Observatory \(LIGO\)](#), a pair of ground-based observatories in Hanford, Washington, and Livingston, Louisiana.

Albert Einstein predicted the existence of gravitational waves in his general theory of relativity a century ago, and scientists have been attempting to detect them for 50 years. Einstein pictured these waves as ripples in the fabric of space-time produced by massive, accelerating bodies, such as black holes orbiting each other. Scientists are interested in observing and characterizing these waves to learn more about the sources producing them and about gravity itself.

<http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.061102>

Observation of Gravitational Waves from a Binary Black Hole Merger

B. P. Abbott et al. (see [the paper](#) for the full author list)

(LIGO Scientific Collaboration and Virgo Collaboration) (Received 21 January 2016; published 11 February 2016)

On September 14, 2015 at 09:50:45 UTC the two detectors of the Laser Interferometer Gravitational-Wave Observatory simultaneously observed a transient gravitational-wave signal. The signal sweeps upwards in frequency from 35 to 250 Hz with a peak gravitational-wave strain of 1.0×10^{-21} . It matches the waveform predicted by general relativity for the inspiral and merger of a pair of black holes and the ringdown of the resulting single black hole. The signal was observed with a matched-filter signal-to-noise ratio of 24 and a false alarm rate estimated to be less than 1 event per 203 000 years, equivalent to a significance greater than 5.1σ . The source lies at a luminosity distance of 410^{+160}_{-180} Mpc corresponding to a redshift $z = 0.09^{+0.03}_{-0.04}$.

In the source frame, the initial black hole masses are $36^{+5}_{-4}M_{\odot}$ and $29^{+4}M_{\odot}$, and the final black hole mass is $62^{+4}M_{\odot}$, with $3.0^{+0.5}_{-0.4}M_{\odot}c^2$ radiated in gravitational waves. All uncertainties define 90% credible intervals.

These observations demonstrate the existence of binary stellar-mass black hole systems. This is the first direct detection of gravitational waves and the first observation of a binary black hole merger.

[Solar mass $M_{\odot} = 1.98892 \times 10^{30}$ kg]

Conclusion

The LIGO detectors have observed gravitational waves from the merger of two stellar-mass black holes. The detected waveform matches the predictions of general relativity for the inspiral and merger of a pair of black holes and the ringdown of the resulting single black hole. These observations demonstrate the existence of binary stellar-mass black hole systems. This is the first direct detection of gravitational waves and the first observation of a binary black hole merger.

NB Mike Whybray will be giving a workshop at Newbourne on Monday 14 March, entitled *Gravity Waves and Black Holes*

See Page 12.

OASI Trustees' Report on Observatory Inspection

by Roy Adams, on 16th January 2016 10:45 - 12:35,
with Neil Morley standing in for David Brown



The inspection had previously been scheduled to occur on 26th January but David Brown's commitment dates changed unexpectedly and, in view of the closeness of the 26th to the AGM on 30th of January and the likelihood of worse weather on the 26th, I contacted Neil Morley who kindly offered an earlier date to ensure more time between the inspection and AGM. An attempt to get in touch with David Payne at the then short notice was made but unsuccessful. In the event the weather on 16th of January proved to be quite fine and sunny.

In brief the condition of the observatory as a whole was on average about the same as before but it is worth going through in detail the many separate aspects as usual for the annual end-of-year inspection.

Entry area – stairs bottom, art room and lift shaft level

There was possibly more content in here than before but lots of this is what can be needed for on-site events and for helping with maintenance and so on. We did not check in the filing cabinets but any need for partial clear-outs no doubt would be in hand.

A new emergency light setup (battery-powered) is now over the main entrance door. The fire extinguisher for this zone is in date until/including April when I check the meter reading may suggest replenishment or new unit.

There is further new emergency lighting, possibly for normal use as well, further up the spiral staircase. Spalling of the plaster is still evident in the lift shaft off the Art Room and on the ceiling of the Art Room – the window in the lift shaft seems in safe condition and otherwise things are much as a year ago.

Belvedere level: main ring area, windows doors and balconies

Just before getting up to this area it was noted that outside of the spiral staircase window the small bit of roof is not being drained; water is still standing there.

The two fire extinguishers for this level were found to be in date the same as the one by the main bottom-of-stairs entry door.

Some wooden door wedges were also seen ready by the Belvedere main door. A good idea!

Checking the balconies' doors, windows going anticlockwise, and balconies:

NW: Same as a year ago. The old TV aerial that was outside has gone. That may have been taken away last year or before but, anyway, we mention it now.

W: This West window has further deteriorated and now has duct tape (which is hardly lasting in adhesive quality even on compatible surfaces) all around it on the inside of the mid-height pane/frame. A ladybird was found to have passed away, apparently in an attempt to hold the glass and frame together. We very seriously wonder what will be next to pass away in view of the possible damage that could be caused, for example, by the window pane being blown in or out (or both if in parts) in certain weather conditions. ONCE AGAIN, we stress URGENT proper renovation is VERY SORELY NEEDED.

The top left-hand corner of the door has gone and the hole there has been stuffed with a polythene plastic bag. An advert for renovation of funding this may well be but one may also wonder which will last the longest – door or bag.

SW, S and SE Balconies: we went out onto only in the south and south-east balconies. All is little changed in regards to cracks IN some places in stonework including in corning above and in spalling of the decorative work on the buttresses.

Concerning use of these balconies, particularly the South East one, Neil said that he had heard that Gerry Pilling, one of our active members, had voiced a fear that shortly, if not attended to, the fast-growing Leylandii or Lawsonii trees close nearby (now in some profusion with their tops level with the balcony floor paving) could interfere with observation lower down in the sky from these vantage points.

Belvedere Annexe

The Annexe phone was checked for outgoing calls ability – one such call was successfully made. The first-aid box complement seems to be complete.

Two general points arose:

1. Is all electrical equipment that is supposed to be certificated and/or checked, for example, annually suitably so covered?
2. A fair Spring clean would not come amiss, especially in the Belvedere area, Dome, Transit Room and, to a lesser extent, on the stairway. Cobwebs are visible in places and, again, litter bin emptying is advisable. I remember seeing a vacuum cleaner somewhere. Does it work?

On the way up to the Dome we also checked the smoke and fire alarms were working.

Library

All appeared well here except that there was a small question about the wooden cornice pieces by the top of the window frame warping somewhat and whether they are they fixed OK. Also the new tall, narrow bookcase to the left of the window would be safer if fixed to the wall behind – maybe even by one screw into a raw plug near its top.

We did not go up to check the storage area over the library. Last time this was looked at was, for Daniel Brown and myself, at least a couple of years ago but nothing was noticed then that warranted much attention, if at all.

Dome level

The condition of the stairway walls here is, apparently, unchanged but we did not have access to records of the strain gauges beyond the central handrail so no exact check of movement was made. No doubt this is occasionally done by someone?

Main Dome central area

The fire extinguisher up here was also in same date as others lower in the building.

The main building structure concern up here is the windows, where at least one is still in constant danger of being blown out or pushed out accidentally by anyone touching the window whilst attempting to look out. This situation has continued worsening for some years and, as very little if anything appears to be stopping flight by the glass to a long way down final smashed destination, we were afraid to touch it. It needs a very gently applied adhesive gizmo of some sensible sort to temporarily secure it to the inside of its frame – AGAIN MENTIONED BEFORE AND URGENTLY.

There is a rectangular chip-out gone from the particular window, 8 cm x 1.5 cm approximately, which could allow enough wind flow through in addition to that around the long gaps at the edges nearby and, as such, could bend the glass away further from the window. Do we need to say any more?!

Varnish the floors: Not at all urgent but it would help to preserve the Dome's floor (and, indeed, the Transit Room's floor and steps, perhaps) as well as present a good appearance to visitors and ourselves.

Main Dome ring/support wheels

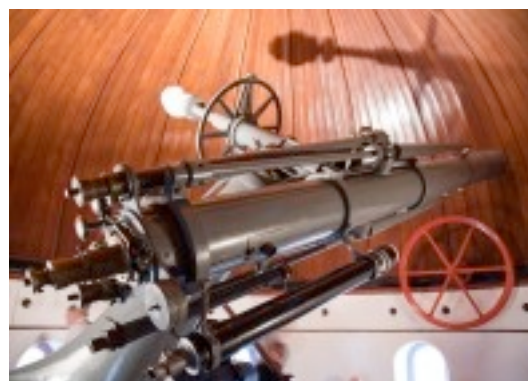
On turning the Dome roof, all support wheels showed to be in contact with the ring on reasonably checking. However, lubrication is considerably lacking in a number of cases and the wicks from the little receptacles, from sample checking, need to be properly checked and filled as need be.

Obviously checking all boxes is too time-consuming for us to do in an overall building inspection. Wheel surfaces are mainly dry also.

Main Tomline 10 inch telescope

The lens has recently had a clean and looks very well for it by looking at the outer surface. We did not open the shutter to do this (or anything else) but the recently added new LED lighting is certainly very bright!

Next, we carried out the usual spring balance torque checks at six compass direction pointings. The seventh we extrapolated for the north west as time was pressing and the north-west is harder to get a couple on. These checks are done principally to see what the current start-to-move minimum drive torque is at the approximately 45 cm radius of the drive gearwheel – needed via the worm gear from the drive motor to follow the sky.



As the torque at the worm gear is too high to directly pull by hand on a spring balance tangentially from a point along the edge of the main gearwheels, an anchor point near the eyepiece is chosen and enough pull is then able to be applied by hand at the approximately 135 cm distance tangentially to the RA axis and that figure, multiplied by 3, is the torque required to be known at the worm and main gearwheel (45 cm radius).

A pull figure, simply for comparison in the opposite anticlockwise direction, is also taken for force needed to manoeuvre the telescope in such a direction. Obviously the clockwise force needed at 0° Declination is also the same as the spring balance pull in manoeuvring the telescope by hand in the clockwise direction.

Telescope pointing	Clockwise at worm gear	Clockwise at eyepiece	Anticlockwise at eyepiece
NE	18	6	4.5
E	18	6	5
SE	19.5	6.5	6
S	15	5	7
SW	21	7	7.5
W	18	6	7.5
NW*	18	6	7.5

* For NW pointing, readings are extrapolated.

Would like to add that's Martin Cook advised us all at the last AGM that the main 90 cm drive gear teeth (and hence also the worm gear) are periodically lubricated by what is known as a dry spray to avoid as far as possible dust, etc., gathering on the gear teeth (which would most likely occur more with an oil spray). The dry spray leaves a graphite or similar coating which acts as the lubricant but which leaves the appearance of the gears as being dry and un-oiled.

However the high pressures on the gearing have generally very slightly worsened and so are still a matter for concern in regard to strain on the gear teeth and worm.

The force needed to move the telescope in declination does not appear to be a problem but it might be interesting, sometime, to see what that is over a range of attitude. Neil discovered a minor squeak from the declination axis at about 10°S.

The large wheeled observing steps could do with attention to the under fabric.

Transit Room

Spalling of the stonework has got rather worse in here and the walls also are suffering mould in places due to the usual condensation. However the 3 1/2 inch Transit Telescope lens has been kept capped and is clean. The brass work has kept in quite reasonable condition.

The 4 inch guide 'scope remains standing, without an eyepiece cover, beneath the sidereal clock and barograph cupboard on the wall, of which the hinges and lock could do with a good de-rusting and oiling. The shutter still sports gaps but ventilation may be a good thing to some degree.

Computer Room

There is some spalling of the stonework right of the entrance as one steps down into the room. This appears to be from moisture ingress otherwise all seems to be in good order.

Thus ends our report for this year. We have pledged help to the school to get Lottery and other Heritage funding, a matter which is ongoing.

We wish everyone another star-studded New Year and good fortune and health.

Roy Adams,

with thanks to Neil Morley for his help on the day

OASI Member of the Year Competition

- Open to any non committee member (at time points earned)
- Runs from 1st September to 31st August each year
- Winner gets a free membership for the following year
- It is the members responsibility to check that they have been credited the points for a particular event

Activity	Points	Activity	Points
Helping at an OASI outreach event	10	Writing a newsletter article (per page)	3
Giving a workshop	20	Introducing a new member	5

NAME	6-Sep Bentley	19-Sep Nowton	23-Oct Chantry	Oct News	Nov News	26-Oct Wkshp	Dec News	Jan News	SGL	Feb News	March News	Total
Pete Richards	10	10		\								20
Nicky Richards	10	10	10	\								30
Mike Nicholls	10	\		\					10	3		23
Bill Barton	10	\	10	15	3					3	6	47
Mike O'Mahoney	\	10		\					10			20
Joe Startin	\	10		\	3				10			23
Charlie Green						20						20
Alan Smith	\	\		3	6		3			18	33	63
Mike Norris	\	\		3								3
Neil Short							3					3
Andy Gibbs									10	3	9	22
Jeremy Startup									10			10

The OASI 'All-sky' Fireball Camera, 1976-86 (Part 2)

Alan Smith

Editor's note: This is the second part of a ~40-page article serialized in OASI News.

See the February edition for Part 1



Abstract

From 1976 until 1986, the Orwell Astronomical Society, Ipswich (OASI) operated a fireball camera on nearly every clear night, providing coverage of most of the heavens. The camera was operated by an ingenious arrangement of electromechanical controls, which was developed throughout the period in question to support increasing automation and performance; the technology employed reflects an era before the embedded processor became ubiquitous. In total, on its retiring, the camera had recorded almost 650 hours of exposures of the night sky, capturing images of numerous meteors, fireballs and several unexplained objects. The original images from the camera were negatives; unfortunately, archiving and retention of these, and of the associated prints, was less than ideal, and many potentially interesting images have degraded or been lost completely with the passage of time². This report describes the evolution of the camera and highlights the most impressive surviving images.

-
- 2 Two instances, from many possible, of the demise of images are as follows. Fireballs were observed visually as follows and noted in the camera log as being captured in the frames specified:
- a) 25 November 1981 at 20:32, frame 17-15. The negative has degraded in the intervening years and no longer shows a discernible fireball trail.
 - b) 12 March 1982 at 19:37:40, frame 21-23. Unfortunately, the frame is no longer available.

Further Improvements And Results

By the end of May 1981, I constructed the first horizon mask. This consisted of thin plastic sheet, painted black and shaped to prevent lights from upstairs windows in neighbouring houses shining directly onto the camera. (I left the roofs of the buildings un-masked in order to allow better orientation of any frames of interest). This first attempt needed more work, and I did not use it regularly.

Figure 11 shows a typical image captured at this time; it is frame 15-15, taken 00:00:00 – 03:08:00 (188 minutes exposure) on 02 August 1981. Star trails and Polaris (circled) are visible. Conditions were logged as 0/10 cloud and magnitude 6 transparency.

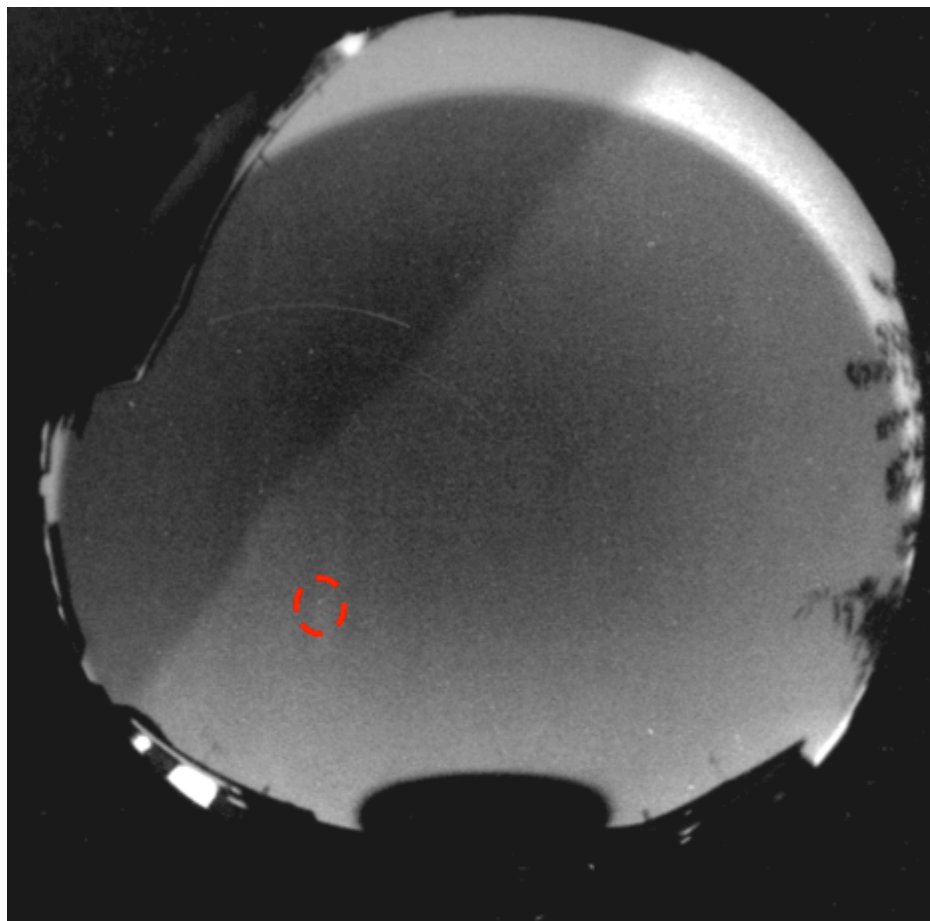


Figure 11. Frame 15-15, taken 02 August 1981.

Figure 12 shows frame 17-15, taken 25 November 1981, 19:42:15-21:25:20. Sky conditions were recorded as magnitude 4, cloud cover 0/10. Although the negative has been badly scratched in the intervening years, it still shows the faint curved trail of a fireball just above the boss; the fireball was observed visually at 20:32.

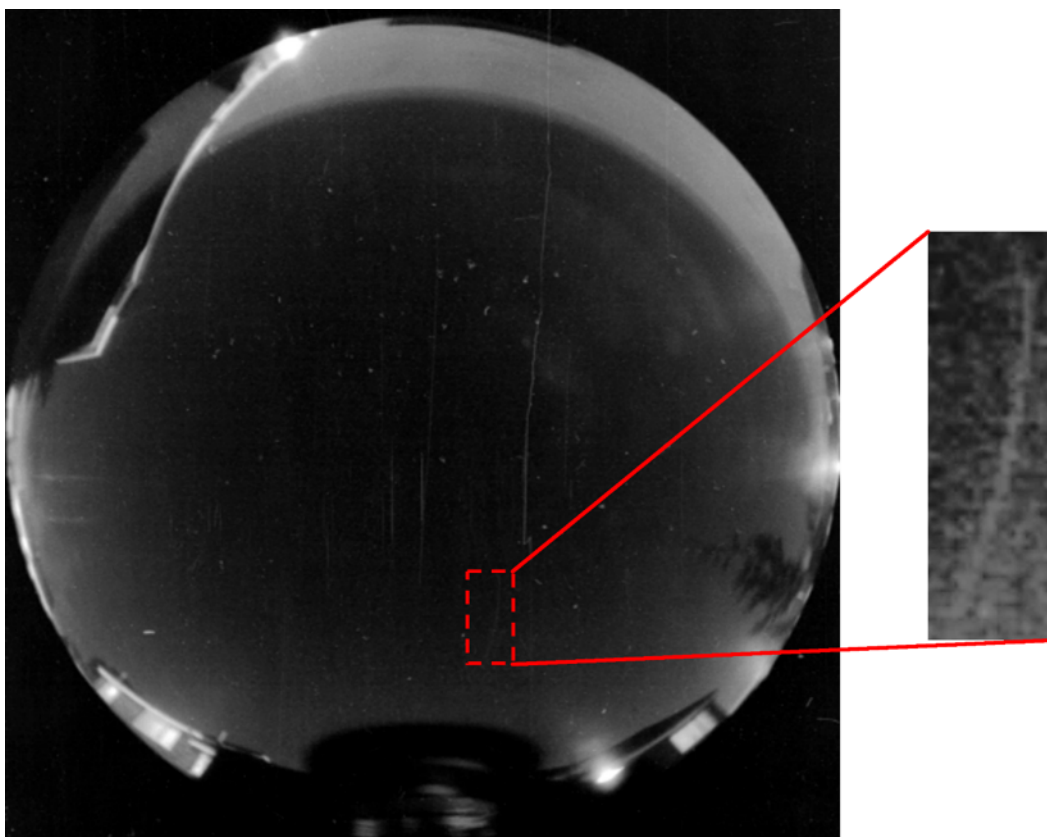


Figure 12. Frame 17-15. Faint fireball.

In November 1981 I tested the effectiveness of the rotating shutter on trails left by firework rockets. This revealed some limitations: a bright trail could create afterglow resulting in an image on film comprising a single, unbroken line. Figure 13 shows frame 17-38, taken 05 November 1981, 18:49:10-19:05:55 with 10/10 cloud, clearly illustrating the effect.

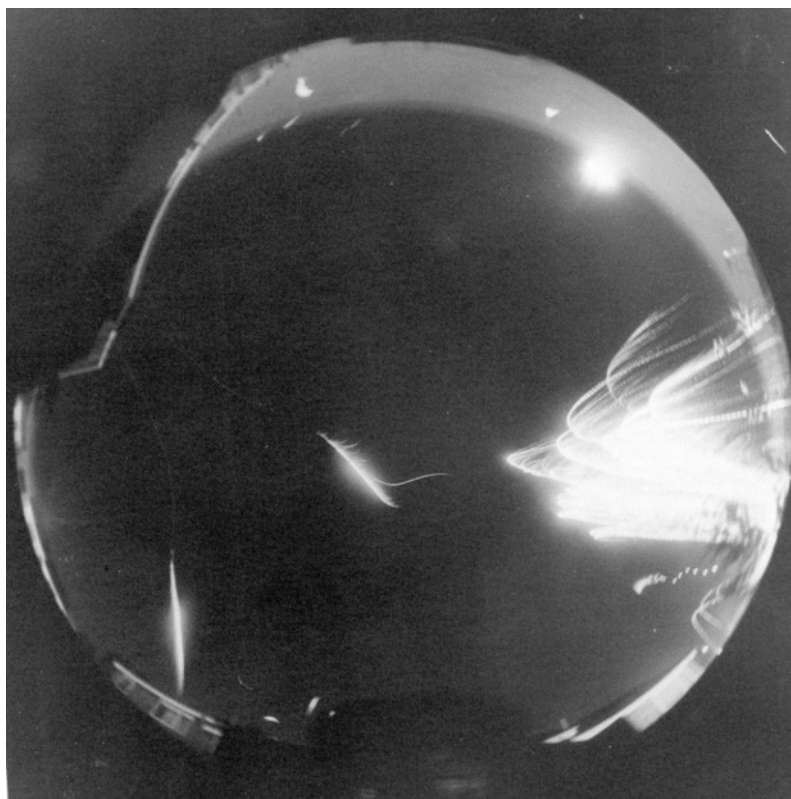


Figure 13. Frame 17-38. Fireworks demonstrate the limitations of the rotating shutter.

The moon could create significant fogging of the image. Figure 14 shows frame 25-42, taken on 22 December 1982, 19:29:55-23:09:30. Sky conditions were recorded as magnitude 3, cloud cover 0/10. A six-day old moon set just before the end of the exposure and caused considerable fogging: compare the sky brightness with figure 12.

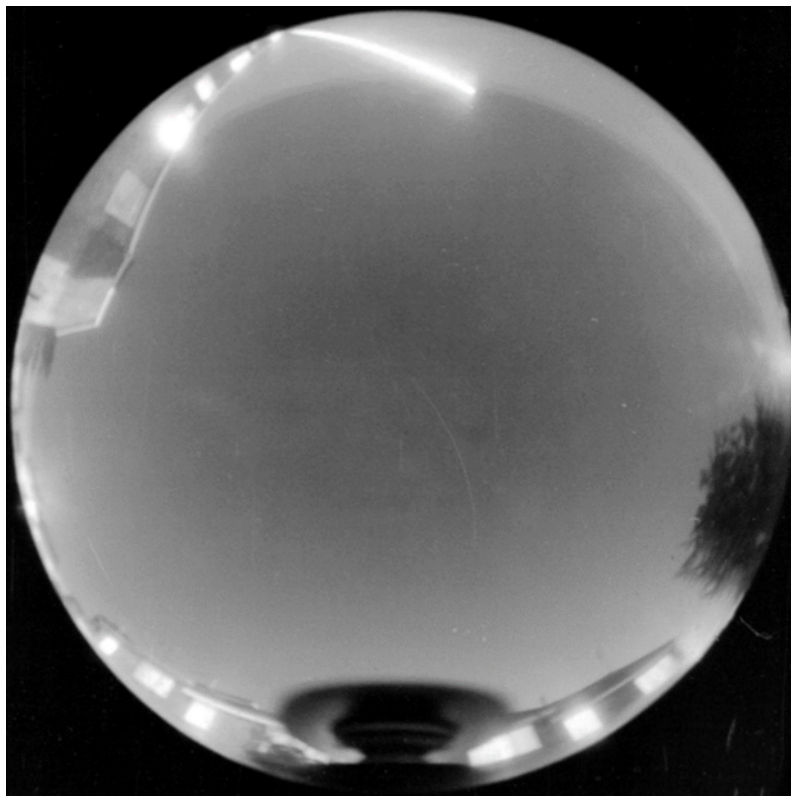


Figure 14. Frame 25-42, taken 22 December 1982.

A New Camera

On 14 March 1983, I installed a replacement (secondhand) camera³. This was a Zenit “B” with a 58mm, f2.8, Helios primary lens (see figure 15). The existing Spiratone afocal lens was mounted on the front of the Helios lens using an adapter fabricated by OASI member Martin Cook. The new lens assembly was slightly faster than the old and produced an image on the film slightly larger at 23mm diameter. I also installed a new rotating shutter assembly.

The following day, new street lights were installed in the neighbourhood increasing background illumination. However, that very night a fireball was recorded on frame 28-29, which ran from 22:36:30-05:00:00 hrs (383 minutes 30 seconds) – see figure 16. Once again there is no horizon mask. Sky conditions are recorded as limiting magnitude 5, 0/10 cloud, however there are no star trails in the image. What appear to be scratches are, I think, aircraft trails. Note that the fireball trail, although exhibiting several flares, including a large terminal event, does not show evidence of breaks caused by the rotating shutter.



Figure 15. The Zenit “B” camera.

³ The old Zorki “4” was returned to the OASI equipment curator.

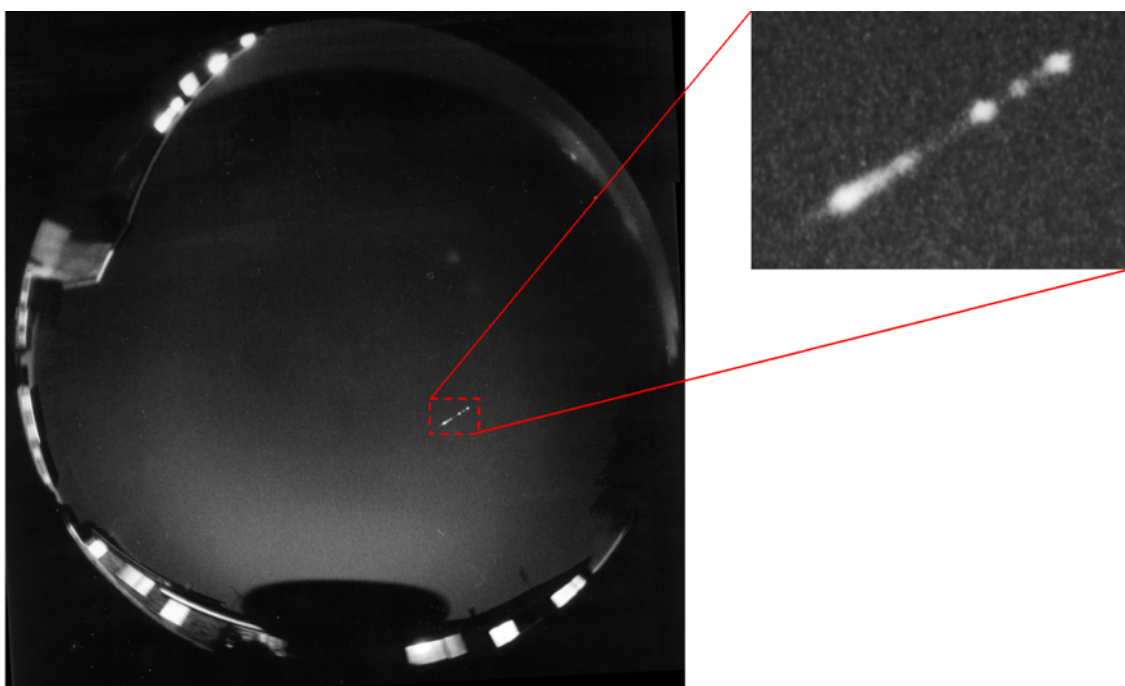


Figure 16. Frame 28-29. Fireball recorded 15 March 1983.

Further Automation And Other Improvements

One of the more significant problems with an automated (or semi-automated) camera is that while it is running unattended, the weather can change significantly over a short period of time, resulting in the equipment becoming wet. Over the years of operation up to 1983, the front surface of the lens of the OASI fireball camera became wet many times, causing further deterioration of the non-reflective coating already marked by scratches.

In May 1983, I addressed the problem with further automation. I constructed a device to close a cover⁴ over the camera lens and rotating shutter in the event of rain. (The shutter was located close to the lens so the easiest solution was a large cover to protect both, rather than a smaller cover for the lens alone.) I fabricated a rain sensor from a plastic sheet (about 50x25mm) with a double spiral of wire attached to it, the conductors separated by about 2mm. The sensor was attached to the top of the camera case. Rain landing on the sheet caused current to flow between the conductors, triggering a two-transistor switch, mounted inside the case, which in turn powered a six volt DC electric motor, controlled by cams and micro switches, to close the shutter and terminate the exposure. Unfortunately, there was no way to record when closure occurred, so the termination times of exposures truncated by rain were unknown. In practice, a heavy dew would also cause the cover to activate.

I conducted various experiments, trying higher speed films and different developing solutions in an effort to increase the speed of the system enabling it to capture more events. It was often necessary to greatly enlarge an image during analysis and it was essential therefore to use films with a small grain. At best, I could achieve a speed rating of around 3200 ASA without degrading the resolution of the film unacceptably.

Unfortunately, in the early 1980s the housing estate around Fountains Road was enlarged and this contributed to an increase in general background illumination of the sky. Matters were compounded by ever-increasing air traffic, with the camera recording many aircraft strobe lights. Figure 17 illustrates the problem. It shows frame 32-19, a 38 minute exposure on 28 October 1983, taken between 19:10:30 and 19:49:00 using Ilford HP5 film triple-developed in Ilford Microphen to give a speed rating of 3200 ASA. Sky conditions are recorded as magnitude 5, 9/10 to 5/10 cloud cover. The image shows some star trails, many aircraft strobe lights and much fogging due to background illumination.

⁴ Continuing the spirit of ingenuity, the cover was in fact the drip tray of a flower pot!

Figure 17. Frame 32-19 showing the combined effects of increased street-lighting, domestic lighting and aircraft strobe lights.

Towards the end of November 1983, I made a further attempt to mask the problem of domestic lighting around the horizon by fixing a shaped, plastic, artificial horizon around the edge of the camera case. Figure 18 shows the benefit thus achieved. It is frame 34-34 taken on 30 November 1983, 18:01:25-18:41:35. The film used was Ilford HP5 (400 ASA) developed in Paterson Acuspeed for 17 minutes at 22°C, push-processed to give an effective rating of approximately 1250 ASA. Sky conditions are recorded as magnitude 5, 0/10 cloud. The horizon mask eliminates some of the domestic lights and Polaris (circled) is easily visible but it is clear that a better profile is required!

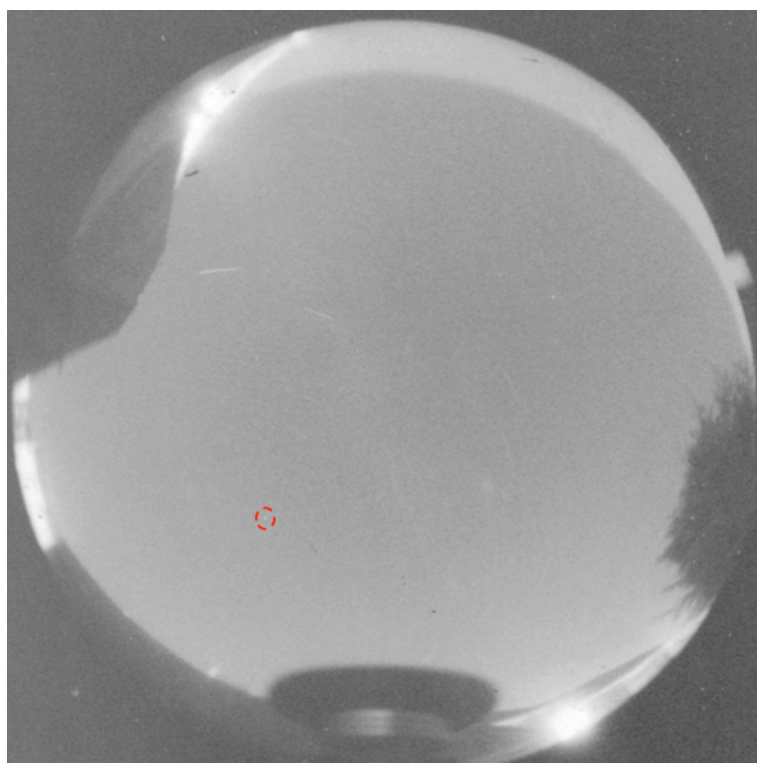
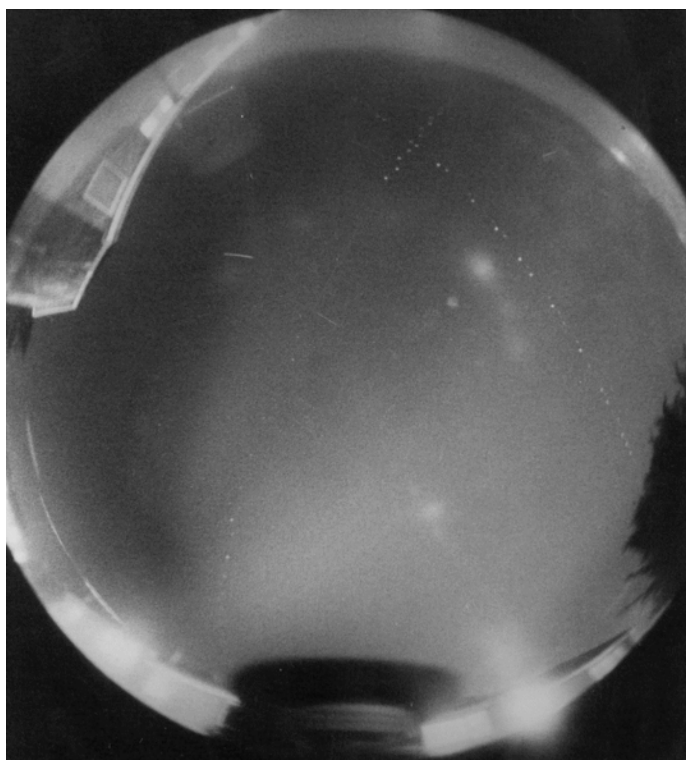
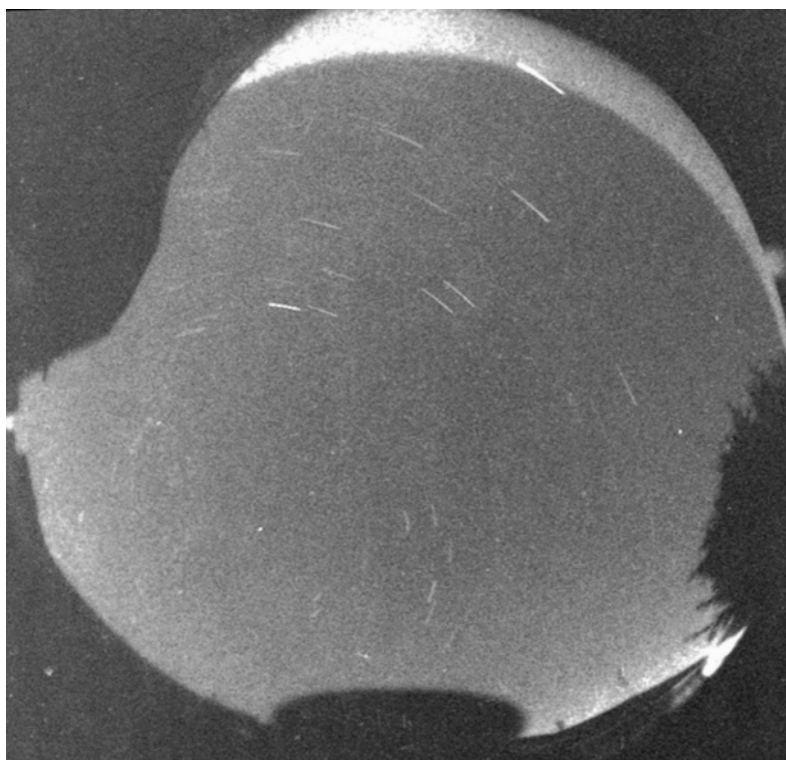


Figure 18. Frame 34-34, illustrating the benefits of a horizon mask (although clearly leaving room for further improvement!)

An alternative to the horizon mask was simply to operate the camera in the early hours of the morning, when the problem of domestic lighting was much reduced. Figure 19 illustrates the benefit of early-hours operation: it is frame 35-15, taken on 03 December 1983, 03:15:20-03:49:55 on HP5 film developed in Paterson *Acuspeed*. Sky conditions are recorded as magnitude 6, 0/10 cloud. Note that even in the unmasked horizon areas there are no domestic lights! This is representative of the best image that I could achieve with the camera around this date.

Figure 19. Frame 35-15, taken in the early hours of the morning.

On 13 December 1983, I fitted an improved horizon mask which effectively eliminated all direct illumination by domestic lighting. (Of course, scattered light from domestic sources remained an issue.) The benefit of banishing domestic lighting rapidly became apparent when, three weeks later, the camera recorded its first “good” fireball trail with many breaks formed by the rotating shutter. Figure 20 shows the image; it is frame 37-34, taken 22:27:30-06:42:00 on 05-06 January 1984 (with automatic end of exposure). The film was Ilford HP5 developed in Paterson *Acuspeed*. The very long exposure (eight and a quarter hours!) shows that the new horizon mask effectively banished domestic lighting. The arc of Polaris is clearly visible with the fireball trail just to the south.



There are around 23 breaks in the fireball trail which, at 10 breaks per second, means that the trail represents approximately 2½ seconds of travel. The object would have been visible for much longer to the naked eye (more sensitive than the film).

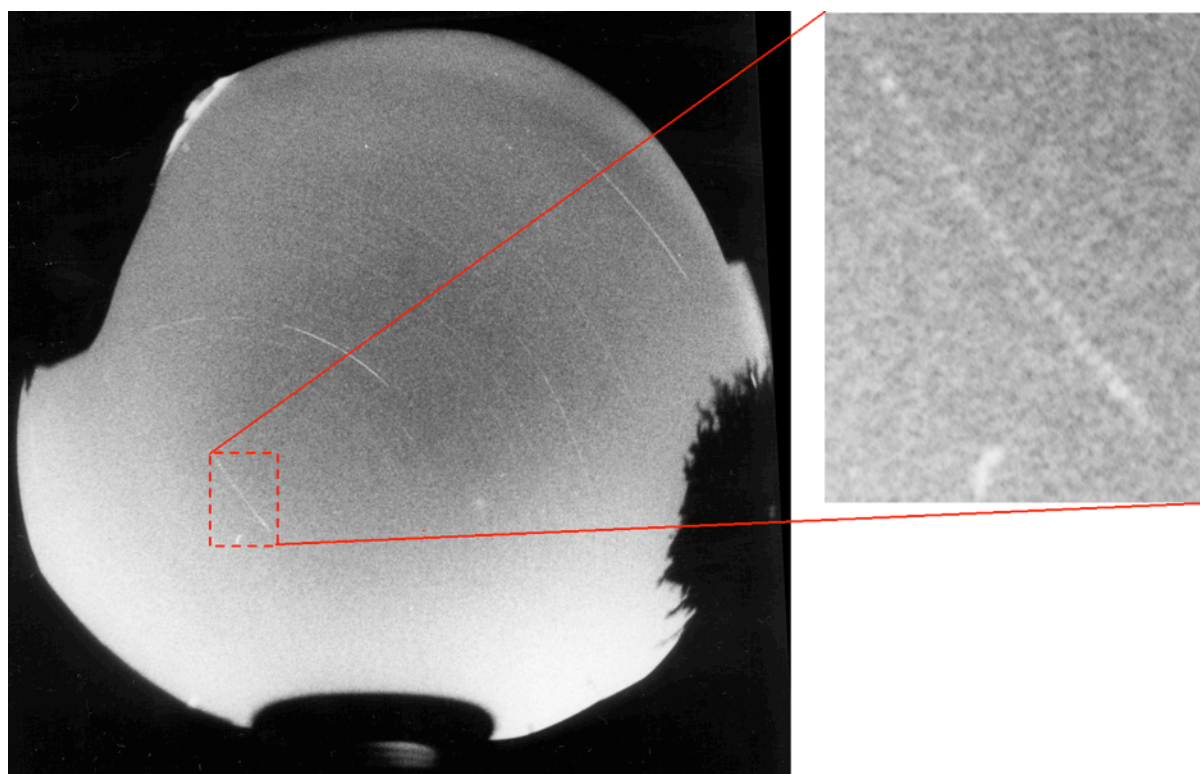


Figure 20. Frame 37-34, taken 05-06 January 1984, showing a fireball trail just south of Polaris.

Various factors conspired to limit the performance of the camera, for example wind shake and vibration, imperfect focus and atmospheric effects. The combined effect was to produce images of both star trails and fireballs with appreciable thickness. (Fireball trails would, in any case, in general have a noticeable thickness.) When a fireball trail was interrupted by the rotating shutter, examination under high magnification revealed a characteristic pattern of alternating light and dark banding (as above, right-hand image).

Figure 21 provides further confirmation of the benefit of the horizon mask. It shows frame 38-36, taken on 29 January 1984, 21:04:15-22:06:05. Sky conditions are recorded as limiting magnitude 4, 0/10 cloud. This one-hour image taken during a typical winter evening shows that the horizon shield largely eliminated domestic glare.

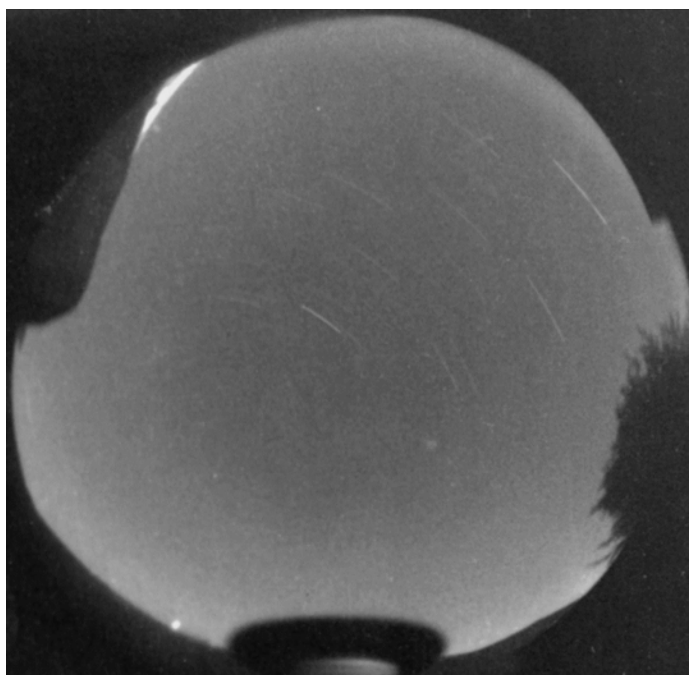


Figure 21. Frame 38-36, taken 29 January 1984.

The horizon shield effectively eliminated direct illumination from domestic lighting.

Next month – Part 3:

- Collaboration
- Further Automation And Other Improvements
- Collaboration
- A Mystery
- A New Camera And Full Automation
- End of the Project
- Appendix – Correspondence With The BMS

A grazing occultation of HIP1397

Alan Smith

The second of this year's grazing occultations was predicted to take place during the early evening of Thursday 11th February 2016.

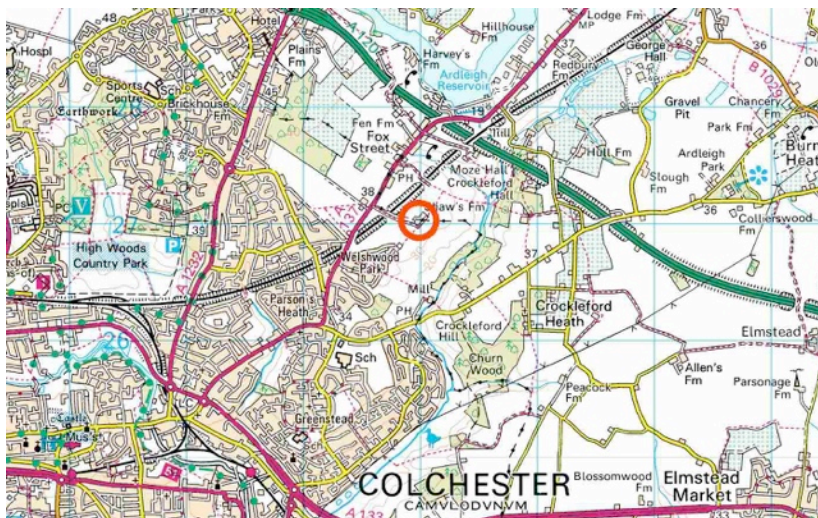
Again, the grazes have been plotted using a freely available software suite (Occult 4.0), which produces detailed plots of the lunar topography and draws a Google Earth line showing the very narrow path of visibility across the Earth. This graze was predicted to pass south of Ipswich close to the Essex/Suffolk border.

As is now usual, a search along the line was made to find the most promising location for us to set up our telescopes, away from vehicles, light pollution and too much interference. Essex is a

difficult area to find suitable sites, but fortunately the graze line passed close to the back garden of a friend of mine. It then turned out that they were friendly with a farmer whose land was even closer to the graze. Introductions were made and permission readily granted. The site, just off the A137 at Fox Street, was close to some outbuildings and on a large, clear concrete hardstanding.

This particular graze was only just 'admissible' as a possibility: at magnitude 7.7 it is almost on the limit to be visible against the glare of the moon, it was still in 'astronomical twilight', low down in the south western sky and would mean travelling almost 50km during the rush hour.

Usually, there are at least half a dozen intrepid observers who are available (and willing) to attend, but on this occasion, holidays and work commitments meant that I was the only person up for it. As is



normal for these events, a 'go/no-go' conference call was set up for 16:00hrs on the 11th of February, with those who had expressed an interest in attending the graze being invited to join the call. In the event, as I was to be the lone observer, Billy Nomates held a conference around the kitchen table with himself. After duly consulting the fir cones and holding a wet finger in the air, it was unanimously agreed that an attempt should be made.

I set off for the site at 16:00hrs and almost immediately joined a huge traffic jam. The main A12 (southbound) was blocked at Martlesham! I eventually cleared the 'roadworks' and with the rest of the trip uneventful, met my friends and proceeded to site, arriving at about 17:30hrs. The sky was still very light with only Sirius (and the moon with lots of 'earthshine') visible. Although mostly clear, there was an ominous looking bank of cloud lurking to the west.

I set up my 250mm Dobsonian mounted Newtonian reflector and with a 25mm eyepiece (about 60 magnification) could not find the faint star. However, by 17:45hrs all was well, the star was acquired and it looked as if the observation might be successful. My friends had brought along a 50mm refractor telescope and even that (just) showed the star. We were then joined by the farm owner and family plus half a dozen members of his staff. All the usual 'oohs and ahhs' when they saw a large telescope for the first time! Fortunately my friends were able to field most of the simple astronomical questions whilst I concentrated on the upcoming graze. Given that there was still almost half an hour to go, I invited the 'audience' to see the rather beautiful, young, crescent moon through the 'Dob'. Again very appreciative noises!

At 18:00hrs the first 'puff' of cloud covered the moon but quickly moved on. I then upped the magnification to about 150 (10mm Plössl eyepiece) and saw that the star was in fact an obvious visual double (in practice, it turns out that it's a triple!) with the main magnitude 7.7 star being closely attended by a magnitude 10 star.

As the graze time approached (18:19hrs) the ever thickening cloud also approached but it wasn't until 18:11hrs that the moon finally disappeared. A pass of the ISS (almost directly overhead) was of course completely clear. More appreciative noises from the assembled throng!

By 18:17hrs the moon and star briefly appeared and at 18:19hrs the star was exactly on the terminator and still visible. I logged a disappearance at 18:18:25hrs but that might have been a 'cloud effect'. The star was again visible at 18:18:40hrs. The first logged disappearance caused by the 'event' was at 18:19:37hrs, followed by a reappearance 4 seconds later. 3 seconds after that a disappearance and at 18:19:50hrs the final reappearance. At 18:20:25hrs the star appeared to clear the limb, then cloud briefly intervened, but by 18:21:07hrs the star was visible well clear of the bright limb and the event was over.

Not a complete disaster, but it would have been nice to see the faint companion star be occulted by the moon as a prelude to the graze.

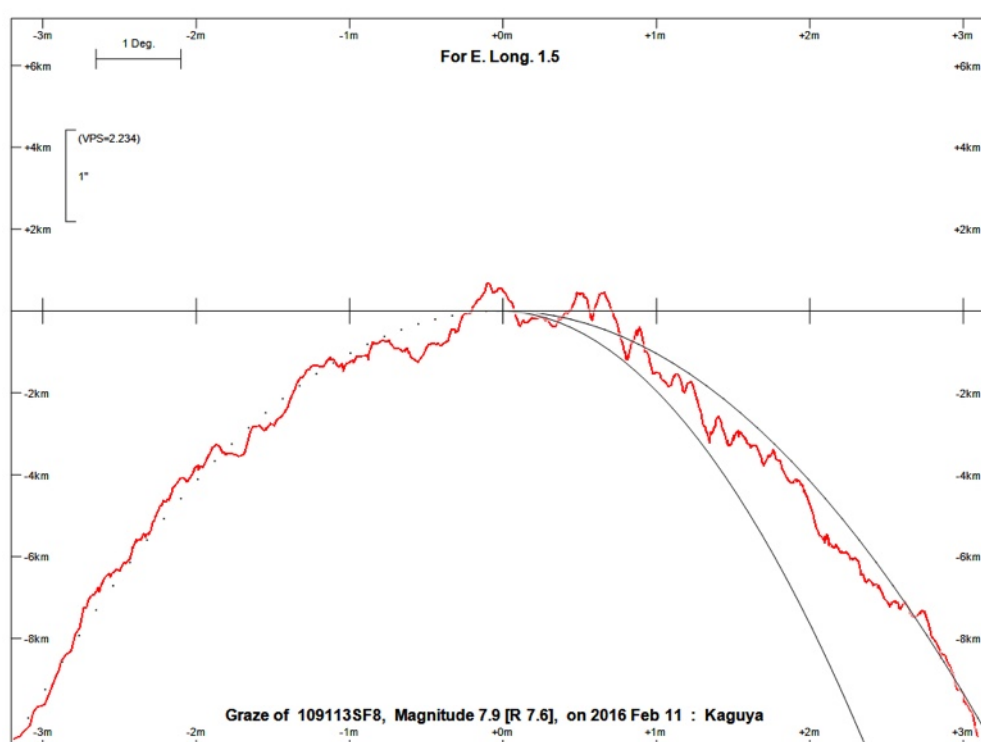
Instead of packing up immediately, I invited the group to look at the moon at both high and low magnification, then we checked out the Orion nebular, Sirius, the Pleiades, and a few terrestrial objects. More 'ohh and ahhs'! The sky by this time was clear (what a surprise) but did cloud over quite quickly (until by the time I got home when it was crystal clear).

And now the "scientific" bit....

The circumstances of the graze of HIP1397 were not ideal:

- The star is a magnitude 7.7 object (located in Pisces).
- The graze was a north limb event. In general terms, the lunar northern limb is less cratered and jagged than the southern, thus the prospect of observing multiple disappearance and reappearance events is reduced.
- The Moon on the evening of 11 February was not very long past new (phase 13% waxing).
- The apparent approach of the star was against the dark limb.
- The event took place at the very inconvenient time of 18:19 UT (Rush our)!
- The altitude of the moon was only 22°.
- Astronomical twilight doesn't end until 19:02 UT, meaning that the crucial minutes before graze, and the event itself were in a still bright sky.

The Occult 4.0 software limb predicted the limb profile below (red line) for the event. My site was about 250m north of the line.



The following diagram illustrates my timings and the theoretical (predicted) timings evaluated from the limb profile generated by Occult.

Hipparcos 1397

Central time: 20160211 181913
Observing location: S1.904477d N, 0.949341d E, 33m (WGS 84)
Lunar libration: -0.58d lon, 2.01 lat, AA axis 3.20d

Observer	D0	R0	D1	R1	D2	R2	D3	R3	18:18:00	18:18:30	18:19:00	18:19:30	18:20:00
Alan Smith	18:18:25	18:19:33	18:19:37	18:19:41	18:19:44	18:19:50							
Theory			18:19:02	18:19:13	18:19:39	18:19:44	18:19:48	18:19:52					
									Clouded out				

The timings associated with the initial disappearance accord well with theory, it is a shame that part of the observation was clouded out!

The values of libration and the position angle (PA) of the lunar axis at the time of the graze are respectively: Long=-0.58°, Lat=2.01° and P=3.2° values. The PA of HIP1379 incident on the geometric lunar limb is -21.6°.

Plotting the resulting position on a good lunar atlas (Philip's Moon Map, ISBN 0-540-01208-4) shows the star to have disappeared behind the east limb of Hermite

Billy Nomates (AKA Alan Smith)

European Astrofest 2016

Kensington Events and Conference Centre, 5 - 6 February 2016

Andy Gibbs

It was Astrofest time again. This time I decided to attend the Friday afternoon session as well as both morning and afternoon sessions on the Saturday.

The undoubted highlight of the Friday afternoon was a presentation by Dr Brian May covering the history of 3-D astronomical imaging since the 1850's. There were also many more recent images from various NASA and ESA missions, including some stunning results from the Rosetta and New Horizons missions. A new, 3-D projection system was used and all the audience were issued with high quality 3-D glasses. If you have a 3-D TV or have seen a 3-D movie at the cinema, you may have thought that the 3-D effect was good. But, believe me, this system is ten times better.

On the Saturday, I attended eight lectures on many diverse and interesting subjects. Highlights included OASI Honorary President, Dr Allan Chapman and Dr John Spencer.

For anybody attending the 2017 US Solar Eclipse, there is an interesting project called "The Eclipse Mega Movie". People will be invited to submit their Eclipse images and videos for research in to coronal dynamics.

Here is the link. <http://eclipsemegamovie.org>

As for the exhibition, I would say that the number of traders attending was down on previous years. This may have been down to the rather cramped conditions and the International Astronomy Show, held in the Autumn, becoming more established. However, there was still plenty of kit to be tempted by, (my credit card did remain in my pocket this time!).

Next year will be the 25 year anniversary of Astrofest, so, I am sure, something big will be planned. It will be held on 10 - 11 February 2017.



The list of lectures I attended is listed below.

Tom Whyntie - *Higgs in Space? Particle Physics Amongst the Stars*

Pete Lawrence - *Observing Highlights of 2016*

John Spencer - *New Horizons: The Long Road to Pluto*

Brian May - *A History of Astro Stereo Photography - Illustrated with Full Screen 3 - D Projection*

Mark McCaughrean - *ESA Science Missions in 2016*

Debbie Lewis - *Taking the Hit - Asteroid Impact Scenarios*

Michelle Heurs - *The Gravitational Universe*

Allan Chapman - *Light Waves, Lunar Geology and Chemical Comets : Robert Hooke*

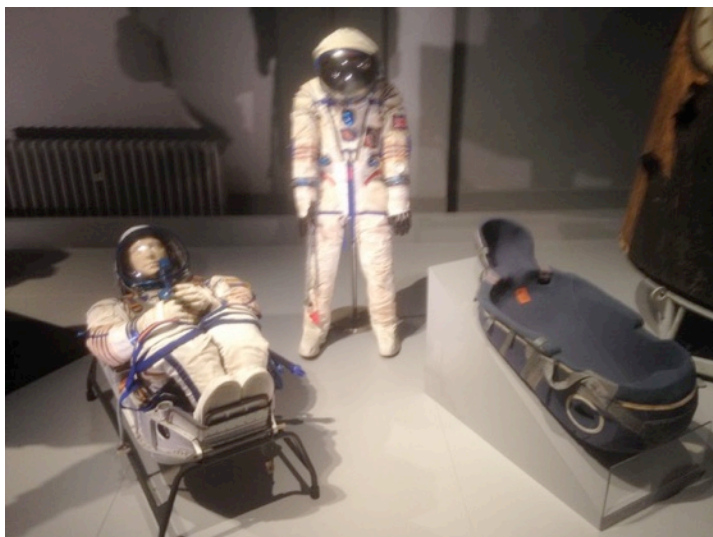
Andrew Pontzon - *Does Dark Matter Exist?*

Hugh Hudson - *The Making of a Solar Eclipse Mega Movie*

Lewis Dartnell - *What Makes a Habitable Planet*

John Spencer - *New Horizons : Pluto Revisited*

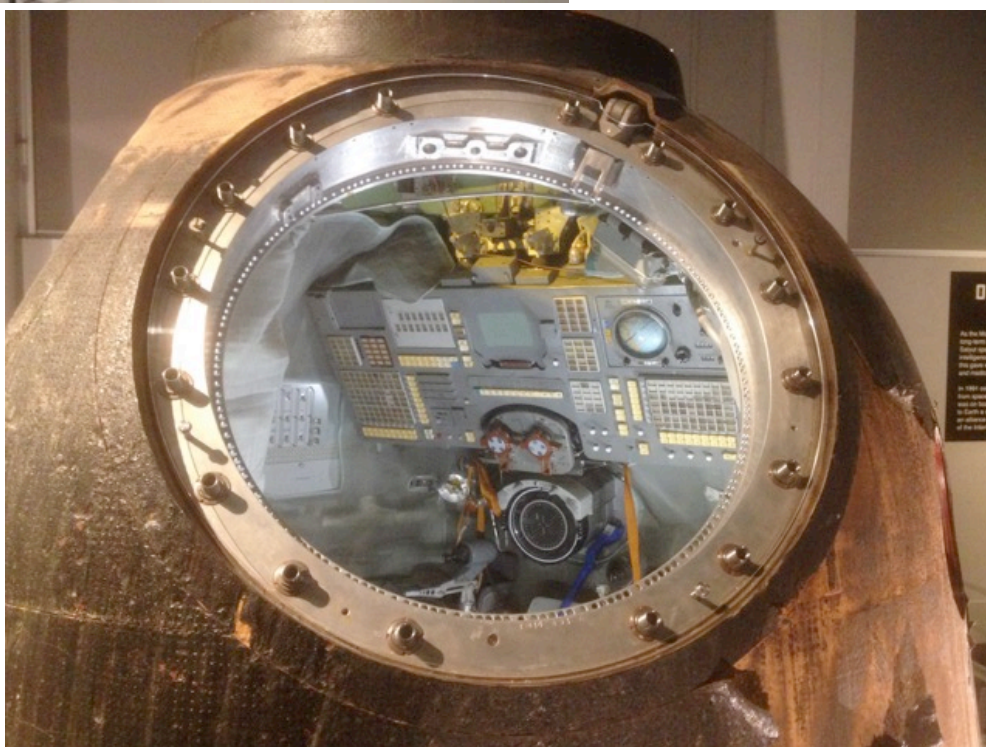
Cosmonauts : Birth of the Space Age

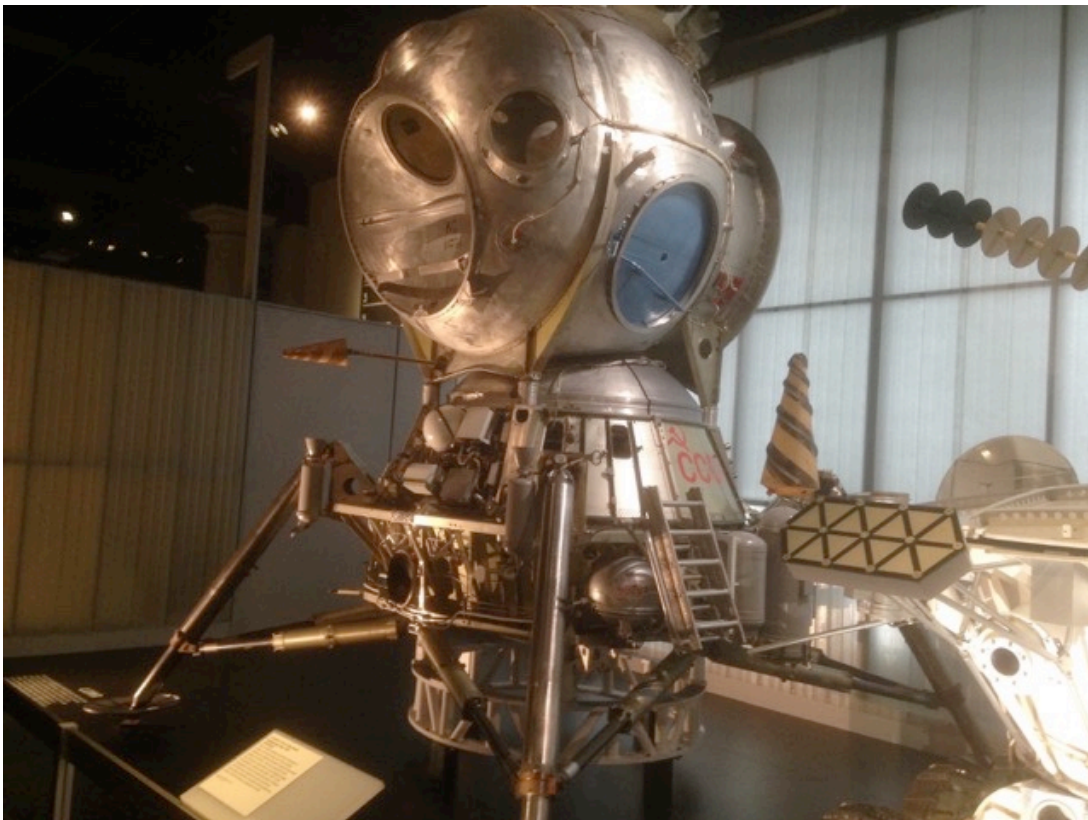


Whilst I was in London for Astrofest, I took the opportunity to visit the nearby Science Museum, to visit the Cosmonauts Exhibition.

On display were many items never seen before outside of Russia. These included space-flown Vostok and Soyuz Capsules, a prototype manned Lunar Lander, Space Suits and other equipment.

The Space Craft were very primitive and cramped, and it must have taken great courage to fly in them.





The exhibition closes on 13th March 2016, it is open until 22.00 on Friday evenings and is well worth a visit.