



OASI News

The newsletter of the Orwell Astronomical Society



Tina Hammond, John Wainwright, Martin Cook, Bill Barton, James Appleton observing the Transit of Mercury at Orwell Park Observatory. Photo by DM.

Trustees: Mr Roy Adams Mr David Brown Mr David Payne
Honorary President: Dr Allan Chapman D.Phil MA FRAS

Camera cooler



Following an article in *Astronomy Now* [1], David Murton has produced a cooling chamber for his Canon DSLR camera.

Peltier coolers [2] are cheap (<£5) but rather inefficient and current-hungry 100W at 12V $\approx$ 8A, so don't rely on a battery.

One side gets cool but the other gets hot, hence the big fan and heatsink outside the box.

The smaller fan and heat sink inside the box circulates the cooled air.



References

1. Astronomy Now, June 2016 p98
2. <https://www.amazon.co.uk/100W-TEC-Thermoelectric-Cooler-Peltier/dp/B007TPCEKI>

Contents

Cover picture: Observing the Transit of Mercury at OPS	1
Inside cover: Camera cooler.....	2
Society Contact details	4
Access into the School Grounds and Observatory Tower	4
Articles for OASI News	4
Reproducing articles from OASI News	5
Committee 2016	5
Society Notices	5
Contacts	5
Next Committee Meeting	5
Signing in and out	5
Welcome New Members	5
OASI and BAA Events	6
Public Solar & Star Parties organised by OASI in 2016	9
Other Star Parties that OASI members may be attending.....	9
Newbourne Observing Group.....	10
Newbourne Observation Group Stargazer's guide	10
Astronomy Workshops	10
Small Telescope Observing Nights (STONs).....	10
Lecture Meetings	11
DASH Astro Events – 2016	11
ISS meets Jupiter	11
OASI Library – Book Review	12
The Night Sky in July	13
Moon	13
Sun, Moon and planets	13
Meteor Showers	14
Occultations during July 2016	14
Paul's Astronomy Podcast for July	14
Visible ISS passes $\geq 15^\circ$ max altitude	15
Iridium flares	16
OASI Member of the Year Competition	16
Notes from the BAA electronic bulletin	17
Transit of Mercury Report.....	18
1 Observations At Orwell Park Observatory	18
2 Andy Gibbs, Observing from South Ipswich	28
3 Mike O'Mahoney, Observing From Felixstowe	30
4 Alan Smith, Observing From Grundisburgh	30
5 Nigel Evans, Observing From North Ipswich	33
6 Neil Short, Observing From Chelmsford	33
7 Gerry Pilling, Observing From Martlesham	34
8 Additional Notes	34
Rocketman	35
Web links	36
Radio astronomy - for the unhurried observer	37
Christchurch Park Solar Observing 28/29 May	39
Astrophotography Day at Woolpit.....	40

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 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 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 13.

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

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

12 July 2016, Douglas Bader [TBC], Martlesham Heath, starting 8.00pm.

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.

Welcome New Members

Mr Chris Johnstone Mr Stephen Tully

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. Entry via the third gate left. NOT the main gate
Sunday 26 June	UCS, Ipswich	David Murton chairman@oasi.org.uk	International SUN Day www.solarastronomy.org
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 From 11:00	Area outside Spa Pavilion, Felixstowe	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
Saturday 16 July From 12:00	Newbourne Village Hall		OASI BBQ Paul Whiting will give a talk on a non-astronomical topic, specifically Chinese and Eastern Cooking. (This is in place of the customary quiz.) There will be display of telescopes and other astronomical equipment. An informal bring & buy sale.
Sun 17 July From 11:00	Area outside Spa Pavilion, Felixstowe	David Murton chairman@oasi.org.uk	Public access event. Alternative date if weather was poor on 10th
Saturday & Sunday 23–24 July	Jimmy's Farm	Paul Whiting treasurer@oasi.org.uk	Science Section at Jimmy's Farm Sausage and Beer Festival,

Date and Time	Location	Contact	Event
Monday 25 July From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Monday 08 August From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Thursday 11 Aug			Perseids peak
Monday 22 August From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Sunday 29 August	Alnesbourne Priory	Mike Norris	Public Solar observing
Sunday 4 September	Bentley Playing Field	Roy Gooding secretary@oasi.org.uk	Bentley Family Day
Monday 5 Sept 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
Saturday 10 Sept	Capel Library	David Murton chairman@oasi.org.uk	Public Star observing
Monday 19 Sept, 23:30	TBA	James Appleton info@oasi.org.uk	Field trip to observe graze of 87 Cet. More info.
Monday 19 Sept, from 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Saturday 24 Sept, 10:00 – 17:30	Burlington House, LONDON W1J 0DU	https://britastro.org	BAA Observers' Workshop <i>Asteroids & Remote Planets</i>
Friday 30 Sept – Sunday 2 Oct	Kelling Heath, Norfolk		Kelling Star Party
Monday 03 October From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Tuesday 4 October	Orwell Park Observatory	Paul Whiting treasurer@oasi.org.uk	Observatory visit. Booking essential.
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>

Date and Time	Location	Contact	Event
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
Friday 28 Oct – Sunday 30 Oct	Haw Wood Farm Caravan Park, Hinton, Saxmundham. IP17 3QT	www.hawwoodfarm.co.uk	Haw Wood Star Party www.brecklandastro.org.uk/bas-star-parties/
Monday 31 October From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Friday 4 November	Felixstowe Golf Club	David Murton chairman@oasi.org.uk	Meal + observing
Tuesday 8 November	Orwell Park Observatory	Paul Whiting treasurer@oasi.org.uk	Observatory visit. Booking essential.
Friday 11 November	Methodist Church Hall Black Horse Lane, Ipswich	Pete Richards lectures@oasi.org.uk	Lecture Meting: Steve Hubbard & Malcolm Brown "Aliens – Are they out there?"
Monday 14 November From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Saturday 19 Nov	Cedarwood School, Kesgrave	David Murton chairman@oasi.org.uk	Public Observing
Monday 28 November From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group
Tuesday 13 December 20:00	Orwell Park Observatory	Paul Whiting treasurer@oasi.org.uk	Observatory visit. Booking essential.
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 19 December From 19:00	Newbourne Village Hall	Avtar Nagra nog@oasi.org.uk	Newbourne Observing Group Christmas event?
Monday 22 December 06:36	TBA	James Appleton info@oasi.org.uk	Field trip to observe graze of Hipparcos 63099. More info.
2017			

Date and Time	Location	Contact	Event
Tuesday 10 January 20:00	Orwell Park Observatory	Paul Whiting treasurer@oasi.org.uk	Observatory visit. Booking essential.
Tuesday 7 February 20:00	Orwell Park Observatory	Paul Whiting treasurer@oasi.org.uk	Observatory visit. Booking essential.
Tuesday 14 March 20:00	Orwell Park Observatory	Paul Whiting treasurer@oasi.org.uk	Observatory visit. Booking essential.
Tuesday 11 April 20:00	Orwell Park Observatory	Paul Whiting treasurer@oasi.org.uk	Observatory visit. Booking essential.
Saturday 29 July	UCS, Ipswich	David Murton chairman@oasi.org.uk	OASI 50th Anniversary
21 August	USA	www.greatamericaneclipse.com	Total solar eclipse

Public Solar & Star Parties organised by OASI in 2016

International Sun Day 26 June

Solar observing outside UCS Ipswich by the “?” art installation. Booking not necessary.

Solar Observing near Felixstowe Spa Pavilion Sunday 10 July

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

Alnesbourne Priory Solar Event on Bank Holiday Monday 29th August.

We usually set up about 10am but Mike Norris will confirm full details nearer the date.

Bentley Family Day – 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.

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

[Kelling Heath Star Party](#) – 30 Sept – 2 Oct

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

[Haw Wood Star Party](#) Friday – 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 Hinton
Saxmundham IP17 3QT

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.

Newbourne Observation Group Stargazer's guide

On the first meeting each month Bill Barton will give a short presentation of what can be viewed in the following 4 weeks. For armchair stargazers (on those cloudy nights) there is a small branch of the OASI Library held at Newbourne and a copy of the full catalogue. See page 19.

NOG Meetings in 2016

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.

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!

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

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 lectures@oasi.org.uk

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.

November 11: Steve Hubbard & Malcolm Brown "Aliens – Are they out there?"

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

Solar observing: 2 July, 6 Aug, 3 Sept



ISS meets Jupiter



ISS conjunction with Jupiter: Photo taken at Woolpit, 16 June, by David Murton

OASI Library – Book Review

Andy Willshire



It is difficult to select which of the many of our antique books to write a short synopsis. However the book I have selected for this month was written by Sir George Biddell Airy KCB, Astronomer Royal and is titled ' Popular Astronomy' and is a series of lectures delivered at Ipswich. It was revised by H.H.Turner M.A.,BSc, and printed by Macmillan and Co. 1895. This was the seventh edition reprint. Airy is of interest to the O.A.S.I. as he purchased a property at Playford , just east of Ipswich.

George Biddell Airy was born at Alnwick on 27 July 1801, one of a long line who could trace their descent back to Kentmere in Westmorland in the 14th century. His branch of the family suffered greatly during the English Civil War and they moved to Lincolnshire where they became farmers. He attended schools at Hereford and Colchester Royal Grammar school and in 1819 attended Trinity College, Cambridge studying maths. In 1822 he was elected scholar of Trinity, and in 1826 was appointed Lucasian professor of mathematics. In February 1828 he became Plumian professor of astronomy and director of the

new Cambridge Observatory., which had at that time only a transit instrument. In 1835 he moved to Greenwich and in 1836 he was elected a Fellow of the Royal Society . In 1840 he was elected a foreign member of the Royal Swedish Academy of Arts and Sciences. He died on the 2nd of January 1892. During his life he wrote copiously about mathematical physics and astronomy, and an account of all of his works cannot be minimised in a short synopsis.

The book contains a concise introduction and six very explicit lectures and a comprehensive appendix. Originally they were presented at the Temperance Hall in Ipswich starting with lecture 1 on the 13th March 1848. Lecture 1 shows evidence for apparent rotation of the heavens round the Earth and the Transit instrument. Lecture 2 is mainly concerned with proof of motion on Earth and among stars. Lecture 3 considers planetary motion and the laws of motion, with lecture 4 mainly about parallax. Lecture 5 considers the precession of the equinoxes and distances to the stars, with lecture 6 introducing the velocity of light which had been deduced by Römer. This has recently been performed by OASI astronomical society. If whilst reading this information a thirst for more precise knowledge is required please look in the 'miscellaneous' section of OASI and read the very informative narrative under the heading 'Airy's Lectures In Ipswich' by Ken Goward , FRAS.

With this small book and the information easily to hand within the society files, this is a most interesting sojourn into the workings of a very dedicated and brilliant man.

References:

https://en.wikipedia.org/wiki/George_Biddell_Airy

Sir George Biddell Airy. (1895) Popular Astronomy :Macmillan and Co.

Ken.Goward. Airy's lectures in Ipswich.

Picture Credit: Wellcome Library, London. Photomechanical print after Lock & Whitfield - [1]

The Night Sky in July

Martin RH

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

Other than for occultations, times are in BST (UTC+1).

Moon

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

New Moon	1st Quarter	Full Moon	Last Quarter
04 July 12:01	12 July 01:52	19 July 23:57	27 July 00:00

Sun, Moon and planets

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

Object	Date	Rise	Set	Mag.	Notes
Sun	1	04:40	21:18		
	31	05:16	20:46		
Moon	1	02:33	17:47		
	31	02:49	18:46		
Mercury	1	04:08	20:50	-1.3	Perihelion 2 July
	31	07:27	21:31	-0.2	
Venus	1	05:13	21:42	-3.7	Perihelion 11 July
	31	06:40	21:22	-3.8	
Mars	1	17:32	01:38	-1.3	
	31	16:11	23:50	-0.7	
Jupiter	1	10:57	00:00	-1.7	
	31	09:27	22:09	-1.6	
Saturn	1	18:46	03:02	1.0	
	31	16:42	00:59	1.1	
Uranus	1	01:01	14:30	5.9	
	31	23:00	12:34	5.8	
Neptune	1	23:49	10:28	7.9	
	31	21:50	08:28	7.8	
(Pluto)	1	21:21	05:27	14.1	For those with big aperture telescopes (the Millennium scope?), Pluto is at opposition on 7 July
	31	19:21	03:36	14.1	

Meteor Showers

Source: BAA Handbook 2016 p97-99

Shower	Limits	Maximum	ZHR at Max	Notes
Ophiuchids	May 19 – Jul	Jun 10 Jun 20	5	Weak activity from several radiants. Best for southern observers. Rather unfavourable
α -Cygnids	Jul 20	Jul – Aug	5	Weak, apparently stationary radiant producing steady activity throughout the northern summer.
Capricornids	Jul 7 Jul 15 Jul 25	Jul – Aug	5	Bright yellow-blue meteors. May have three maxima and multiple radiants.
δ -Aquarids	Jul 15 – Aug 20	Jul 28 Aug 6	20 10	Fine southern shower with double radiant. S component is the richer. Meteors tend to be faint. Favourable.
Piscis Australids	Jul 15 – Aug 20	Jul 31	5	Southern shower in need of observation. Favourable.
α -Capricornids	Jul 15 – Aug 20	Aug 2–3	5	Long, slow fireballs are often seen. Favourable
ι -Aquarids	Jul – Aug	Aug 6	8	Rich in faint meteors. Double radiant. Favourable

Occultations during July 2016

James Appleton

Only one lunar occultation occurs during the month. The table lists occultations during the month, of stars to magnitude 5.0, where the circumstances are favourable. The events should be readily visible in small telescopes or binoculars. The first two columns list the date and time (UT) of the occultation. Column three gives the phenomenon: 'D' denotes a disappearance and 'R' a reappearance. The table lists circumstances of disappearances and reappearances as dictated by the visibility of each phenomenon (determined by altitude, lunar phase, etc). Column four details the lunar phase ('+' for waxing and '-' for waning). Columns five and six give the altitude of the Sun and the star, both in degrees. (A negative solar altitude means that the Sun is below the horizon.) Columns seven and eight provide the star's magnitude and catalogue number.

The data relates to Orwell Park Observatory, but will be similar at nearby locations.

Please note that **times are shown in UTC** not BST.

Date	Time (UT)	D/R	Lunar Phase	Sun Alt(°)	Star Alt(°)	Mag	Star
18 Jul	23:52:37	D	0.99+	-17	18	6.0	ZC 2773

Paul's Astronomy Podcast for July

Paul Whiting FRAS [Podcast, July 2016 www.oasi.org.uk/2016_07_pod.mp3](http://www.oasi.org.uk/2016_07_pod.mp3)

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

Martin RH

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

Times are BST. Predictions are approximate [12 June] due to craft adjustments. Check the day before.

Date	Mag	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
13 Jul	-1.6	03:49:21	10°	SSW	03:51:55	21°	SE	03:54:27	10°	E
15 Jul	-2.4	03:39:37	13°	SW	03:42:11	34°	SSE	03:45:12	10°	E
16 Jul	-1.9	02:48:28	21°	S	02:49:22	23°	SSE	02:52:03	10°	E
17 Jul	-1.2	01:57:17	15°	SE	01:57:17	15°	SE	01:58:38	10°	ESE
17 Jul	-3.1	03:29:52	14°	SW	03:32:31	52°	SSE	03:35:44	10°	E
18 Jul	-2.7	02:38:39	30°	SSW	02:39:37	38°	SSE	02:42:41	10°	E
19 Jul	-1.9	01:47:23	24°	SE	01:47:23	24°	SE	01:49:32	10°	E
19 Jul	-3.4	03:19:58	13°	WSW	03:22:52	72°	SSE	03:26:09	10°	E
20 Jul	-3.3	02:28:40	32°	SW	02:29:54	57°	SSE	02:33:07	10°	E
20 Jul	-3.4	04:02:59	10°	W	04:06:16	86°	S	04:09:33	10°	E
21 Jul	-2.7	01:37:20	39°	SE	01:37:20	39°	SE	01:40:04	10°	E
21 Jul	-3.4	03:09:57	10°	W	03:13:14	85°	S	03:16:31	10°	E
22 Jul	-1.2	00:45:59	16°	E	00:45:59	16°	E	00:46:55	10°	E
22 Jul	-3.5	02:18:34	27°	WSW	02:20:12	76°	S	02:23:29	10°	E
22 Jul	-3.4	03:53:19	10°	W	03:56:36	77°	S	03:59:52	10°	ESE
23 Jul	-3.4	01:27:09	61°	SSE	01:27:10	61°	SSE	01:30:25	10°	E
23 Jul	-3.4	03:00:16	10°	W	03:03:33	85°	S	03:06:50	10°	E
24 Jul	-1.8	00:35:42	25°	E	00:35:42	25°	E	00:37:20	10°	E
24 Jul	-3.5	02:08:17	19°	W	02:10:29	86°	S	02:13:47	10°	E
24 Jul	-3.3	03:43:38	10°	W	03:46:52	58°	SSW	03:50:05	10°	ESE
25 Jul	-3.5	01:16:44	52°	WSW	01:17:25	79°	S	01:20:42	10°	E
25 Jul	-3.5	02:50:33	10°	W	02:53:49	73°	S	02:57:05	10°	ESE
26 Jul	-3.1	00:24:54	53°	ESE	00:24:54	53°	ESE	00:27:36	10°	E
26 Jul	-3.5	01:57:28	10°	W	02:00:45	84°	S	02:04:01	10°	E
26 Jul	-2.9	03:33:56	10°	W	03:37:00	38°	SSW	03:40:05	10°	SE
26 Jul	-3.2	23:28:08	10°	SW	23:31:19	49°	SSE	23:34:30	10°	E
27 Jul	-3.5	01:04:22	10°	W	01:07:39	86°	S	01:10:56	10°	E
27 Jul	-3.3	02:40:47	10°	W	02:44:00	54°	SSW	02:47:12	10°	ESE
27 Jul	-1.7	04:17:49	10°	WSW	04:19:55	16°	SW	04:22:01	10°	S
27 Jul	-2.8	22:35:18	10°	SW	22:38:19	35°	SSE	22:41:20	10°	E
28 Jul	-3.5	00:11:16	10°	W	00:14:32	81°	S	00:17:49	10°	E
28 Jul	-3	01:47:40	10°	W	01:51:49	43°	SE	01:54:11	10°	ESE
28 Jul	-2.2	03:25:18	16°	WSW	03:27:02	24°	SSW	03:29:44	10°	SSE

Date	Mag	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
28 Jul	-2.2	21:42:39	10°	SSW	21:45:21	24°	SSE	21:48:03	10°	E
28 Jul	-3.5	23:18:10	10°	WSW	23:21:26	69°	SSE	23:24:42	10°	E
29 Jul	-3.1	00:54:33	10°	W	00:57:17	58°	W	00:57:17	58°	W
29 Jul	-3.3	22:25:09	10°	WSW	22:28:21	53°	SSE	22:31:34	10°	E
30 Jul	-3.5	00:01:26	10°	W	00:04:42	86°	S	00:05:35	45°	E
30 Jul	-2.8	21:32:15	10°	SW	21:35:18	38°	SSE	21:38:23	10°	E
30 Jul	-3.5	23:08:17	10°	W	23:11:34	84°	S	23:14:01	17°	E
31 Jul	-2.1	00:44:41	10°	W	00:46:34	31°	W	00:46:34	31°	W
31 Jul	-3.4	22:15:10	10°	WSW	22:18:25	73°	S	22:21:42	10°	E
31 Jul	-3.5	23:51:32	10°	W	23:54:49	79°	S	23:55:03	73°	SE

Iridium flares

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

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/monthly sky notes	20/10	Introducing a new member	5

NAME	2015 Q4 total	SGL	Feb News	Mar News	HW Park	Nowton Park	Apr News	May News	W/S MSN	CC Park	June News	July News	Total
Pete Richards	20												20
Nicky Richards	30												30
Mike Nicholls	10	10	3		10		3			10			46
Bill Barton	38		3	6		10	3	3	10	20	3	10	106
Mike O'Mahoney	10	10								10			30
Joe Startin	13	10								10			33
Charlie Green	20												20
Alan Smith	12		18	33			3	36				6	108
Mike Norris	3									10			13
Neil Short	3											3	6
Andy Gibbs		10	3	9		10				20	3	6	61
Jeremy Startup		10			10								20
Richard Gruber					10								10
Joe Walsh					10								10
Gerry Pilling												3	3
Tina Hammond										10			10

Notes from the BAA electronic bulletin

Noctilucent Cloud season begins.

NLC has been seen as far south as Northern England(1/2 June 2016) and could be visible further south.

Look north about an hour after sunset to see bright electric blue clouds that look like patterns in the sand. They are quite bright so can be seen even in strong moonlight or heavy light pollution. Any reports would be welcome to sandra-b@hotmail.co.uk

Cheers & clear skies(which I don't have at the moment)

Sandra Brantingham
Aurora (and NLC) director

BAA Sky Notes videos

Our survey of amateur astronomers which was undertaken earlier in the year was most successful and has highlighted areas where the BAA could do more to support all amateurs, whether members of the BAA or not.

Throughout the observing year many of the BAA meetings feature a Sky Notes presentation, which outlines key astronomical events in the coming months and features recent observations. We would like to share the Sky Notes video freely with all amateur astronomers and would be grateful if you would share this email containing the link to the video with your members.

Our latest Sky Notes presentation, given at our meeting on May 25, is available on YouTube here: <https://youtu.be/G9P6AymgC58>

If individuals or groups would like to receive the link to the Sky Notes on a regular basis please email webmaster@britastro.org.

As always, if there are ways you think the BAA can help support local clubs and societies and amateur astronomers in general please do let me know.

Jeremy Shears

New NOVA IN SCORPIUS PNV J17381927-3725077

Although a bright(ish) new nova has been discovered in Scorpio it is well to the south and sadly not visible from the UK. However, for those of you with access to telescopes in the southern hemisphere you are encouraged to have a go at it.

It was discovered by Hideo Nishimura, Shizuoka-ken of Japan on 2016 June

10.63UT at magnitude 12.4 using a 200-mm f/3.2 lens + Canon digital camera EOS 5D and CCD. It is located at: RA 17h 38m 19.27s DEC -37 25' 07.7" (2000).

Apparently, nothing was visible at this location on an image of 2016 May 14.71UT, May 18.61UT or June 5.53UT to a limiting magnitude of 13.0.

A mag 11.8, pre-discovery image has been found by T. Kojima, Gunma-ken, Japan, on three frames using 135-mm lens + Canon EOS 6D digital camera, who also advise nothing was visible at this location on two patrol frames (Limiting mag.= 13) taken on 2016 June 5.582 UT.

K. Ayani, Bisei Astronomical Observatory (BAO) obtained a low-dispersion spectrogram (resolution 0.5 nm, range 400-800 nm) of this PNV with the BAO 1.01-m telescope. It has a prominent and broad H-alpha emission line (FWHM) about 1800 km/s, equivalent width about 23 nm) and a broad H-beta emission line, which shows that the PNV is a nova in early phase.

As always, you should report your observations to the BAAVSS and if you are unsure how to do that then please contact the Director.

Roger Pickard, Director BAAVSS

Transit of Mercury Report

Compiled by James Appleton

The full report is available on our web site

http://www.oasi.org.uk/Obsvns/20160509_ToM/20160509_ToM.php

1 Observations At Orwell Park Observatory

James Appleton and Martin Cook coordinated arrangements for observing the transit from Orwell Park Observatory. After some debate, they decided to utilise the Tomline Refractor to project an image of the solar disk, which could be studied visually and photographed, leaving observers on the balconies of the Observatory to use more sophisticated electronic imaging in both white light and H α wavelengths.

1.1 In The Dome

Preparations

Experience with the [transit of Mercury on 07 May 2003](#) and the [transit of Venus of 08 June 2004](#) demonstrated the benefit of an effective sunshade in minimising ambient sunlight entering the dome, thereby improving the contrast of the projected image. The sunshade used in 2004 comprised essentially a lengthy home-made blind attached to the dome via nylon cords passing through eyes screwed into the wooden framework around the aperture. The end of the telescope holding the object glass (OG) protruded through the sunshade. By adjusting the length of various cords in a coordinated manner, the sunshade could be raised and lowered to match the altitude to which the telescope was directed.



Fig. 1. Erecting scaffolding in the dome. (JMA)

The sunshade used in 2004 worked to a reasonable extent but did not fit well the curvature of the inside of the dome and thus allowed considerable ambient light to enter. James and Martin therefore planned a new, improved sunshade. Planning started several weeks in advance and initial thoughts were simply to fabricate a sunshade similar to that used in 2004 but with more cords enabling it to be held tighter to the curvature of the dome. Eventually, however, a more elaborate scheme evolved, based on a pair of runners fitted to the interior side of the aperture of the dome, with the sunshade held in position between the interior of the dome and the runners. Matthew Leeks constructed the runners from 15 mm copper pipe and brought them to the Observatory on Wednesday 27 April where, together with Alan Smith, he shaped them to the correct curvature. The following Wednesday, James, Martin, Matthew and Alan erected scaffolding in the dome (Figure 1) and secured the runners in position, using brackets fabricated by Martin (figure 2).



Fig. 2. Fitting the runners for the sunshade. (ML)

Two days later, James constructed a sunshade from 10m of material secured to wooden battens; despite leaving work early to begin the task, practical difficulties meant that work continued late into the night! The following day, James, Martin, Matthew and Alan attended the Observatory and fitted the sunshade; as the Sun was shining in a clear sky, they were able to test its effectiveness. Unfortunately, it was immediately apparent that the material was just too thin and the degree of obscuration was far short of what was necessary.

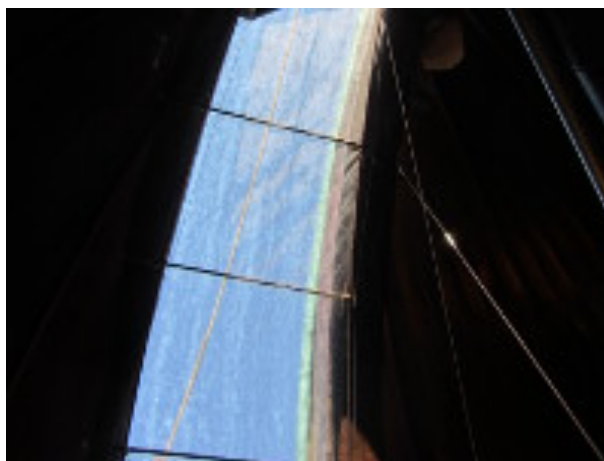


Fig.3. Material of the sunshade provides limited obscuration. (JMA)

With the aperture of the dome turned in the opposite direction to the Sun, the blue of the sky was clearly visible (figure 3); conversely, with the aperture turned towards the Sun, the material allowed enough sunlight to enter the dome to cast a distinct shadow of the telescope on the projection screen, and the solar image had poor contrast (figure 4). The personnel withdrew to consider the best course of action.



Fig. 4. Solar image with very poor contrast. (JMA)



Fig. 5. Enhancing the sunshade. (JMA)

The following day, James and Martin returned to the dome determined to improve matters. Enhancements included doubling the thickness of material used for most of the length of the sunshade (figure 5), obscuring the arched windows at the base of the dome, and fitting a 1 m square shadow screen at the OG-end of the telescope.

After many hours of work, the task was complete and the dome was ready!

The new sunshade worked well: figure 6, taken on the day of the transit, looking along the length of the telescope, shows the considerable attenuation of direct sunlight provided by the sunshade, and shows too the shadow screen. Collectively, the light-exclusion measures considerably reduced the ambient illumination in the dome. The Tomline Refractor produced an image of the Sun 50 cm in diameter, with good contrast, and no hint of a shadow of the telescope on the projection screen.



Fig. 6. The sunshade and shadow screen. (JMA)

Arrival At Orwell Park On 09 May

On the day of the transit, James, Martin and David Murton were first to arrive at the Observatory, at approximately 09.30am. After helping to transport David's imaging equipment to the south-west balcony, where he began setting up, James and Martin went to the dome to prepare the Tomline Refractor. They selected a large, ex-military surplus eyepiece (the same as that employed for observation of the transit of Venus in 2004).

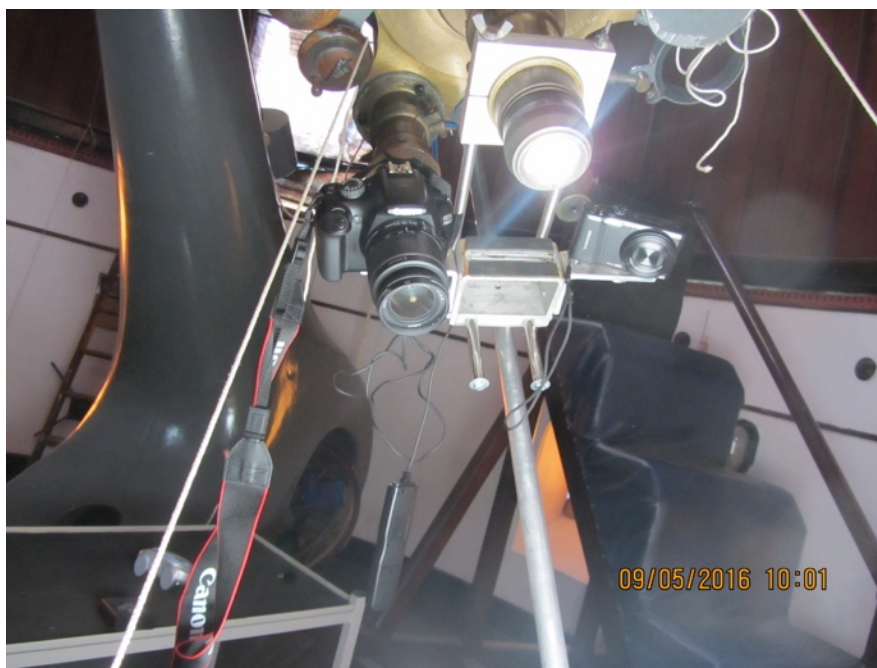


Fig. 7. Cameras fitted to the Tomline Refractor. (JMA)

The aperture of the dome was so well obscured that it was difficult at first to align the Tomline Refractor on the Sun. Eventually the pair succeeded, whereupon two sunspot groups (Active Regions 2542 and 2543) together with a few isolated sunspots were immediately visible. There was no evidence of granulation or plages. Martin fitted his Canon D1100 and Samsung WB750 cameras to the mounting bracket at the eyepiece end of the Tomline Refractor (figure 7) and centred them on the region where 1st contact would occur. He secured a large radio-synchronised "Rugby" clock (more properly an MSF clock) to the corner of the projection screen for timing events. Once the preparations were complete, he took some photos of AR2542 (figure 8) to test the cameras.

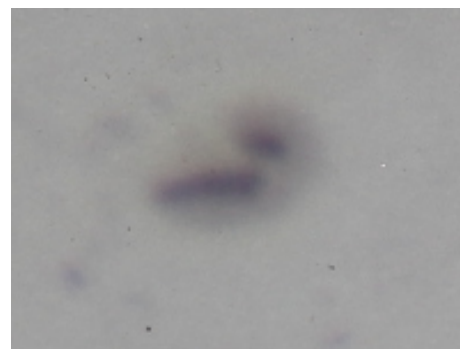


Figure 8: AR2542



Figure 9: Temperature showing 548.3 C ... and rising!

Bill Barton and Paul Whiting arrived at the observatory at 10.00am, and John Wainwright shortly thereafter. Preparations complete, the observers settled down to wait for ingress to begin. The weather was promising: the sky was clear! To provide some light entertainment, Martin employed an industrial thermocouple to measure the temperature of the Sun's rays concentrated by the eyepiece of the Tomline Refractor. After a few seconds at the focus, the thermocouple glowed bright red and the temperature reading went off the scale at 750°C! (Figure 9.)



Figure 10: Tina Hammond, John Wainwright, Martin Cook, Bill Barton, James Appleton

Shortly after 11.00am, more observers arrived: Adrian Cubitt, Tina Hammond, Richard Stansfield and Mike Whybray. Figure 10 shows some of the observers studying the projection, waiting for the transit to begin.

Approximately 15 minutes before the transit started, some thin cloud passed in front of the Sun, causing a loss of definition of the projected image. Fortunately, the cloud passed after approximately five minutes, and definition returned. The observers gathered around the projection screen and Martin set the cameras so that the D1100 took a still image every approximately 4s and the WB750 recorded a video (which terminated shortly after 2nd contact). A handheld "Rugby" clock was placed briefly in the field of view of the WB750 to provide a timing reference for later, off-line analysis of the video. The observers then concentrated on the image, waiting for 1st contact.

Ingress Phase

The observers recorded the following event times (UT). Paul was first to detect the barely-perceptible indentation of the silhouette of Mercury on the Sun's east limb, at 11:12:45. Once he indicated the phenomenon, other observers were immediately able to see it too, thus all observers were reasonably confident that they had observed the silhouette of Mercury within a few seconds of the instant of 1st contact. However, there was no such certainty in the estimation of 2nd contact due to a prolonged teardrop effect. At 11:13:32, Paul detected the teardrop, but this was not confirmed by other observers. At 11:14:20, Paul called out an observation of 2nd contact, but this was not confirmed by other observers, and was later thought to be an error. Paul called out the instant of 2nd contact again at 11:14:36 and at 11:14:39 and several observers in the dome agreed that 2nd contact occurred somewhere around these times. However, other observers were of the opinion that there was still a pronounced teardrop effect at this time, and the silhouette of Mercury had not detached from the solar limb. Nonetheless, all present agreed that 2nd contact had certainly occurred before 11:15:16.

Later, James and Martin independently analysed the video recording and produced off-line estimates of event times. The following table compares the various empirical estimates together with predicted contact times calculated using the NASA JPL ephemeris DE-431.

Estimate	1 st contact	2 nd contact
Observers in dome	11:12:45 (Paul Whiting)	Possibly 11:14:36 – 11:14:39, certainly by 11:15:16
James Appleton (video)	11:12:38	11:15:35
Martin Cook (video)	11:12:38	11:15:33
Predicted	11:12:23	11:15:35

Estimates of event times (UT).



Figure 11 above (by MPC) is a montage of the images from the D1100 during the period 11:12:37 – 11:16:15 UT, from approximately the instant of 1st contact until after 2nd contact. It shows the very pronounced teardrop effect extending from approximately 11:14:09 – 11:15:27 UT. (Note that the timer triggering the camera was not completely accurate, and a few images deviate from the

intended 4 second periodicity.) Observers with handheld cameras also recorded the teardrop effect: see figure 12, compiled from images by James Appleton taken with a Canon PowerShot SX220, 11:13:24 - 11:15:48 UT (note that the images are not evenly spaced in time).

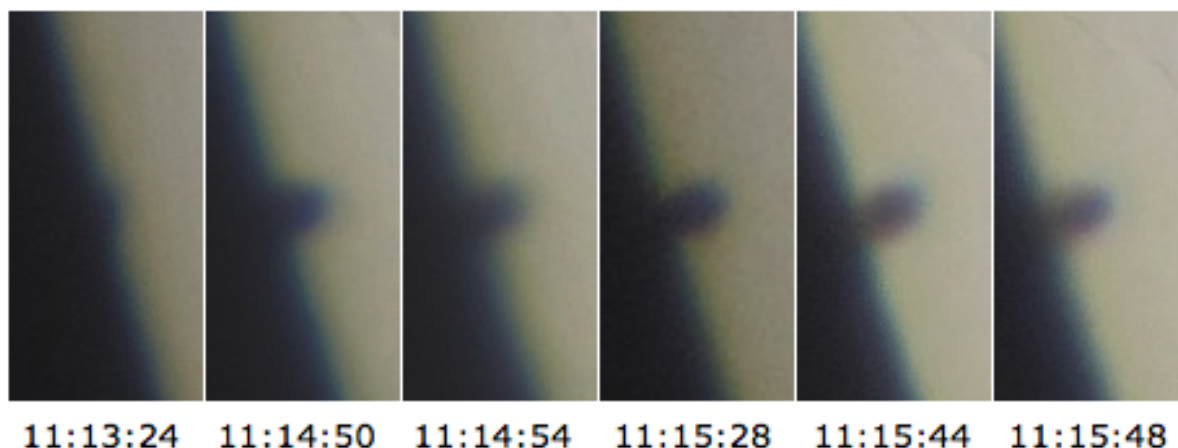


Figure 12: The teardrop effect (JMA)

After 2nd contact, the diameter of the silhouette of Mercury was measured as approximately 3 mm, illustrating the huge difference in scale between the planet and the Sun, the image of which had a diameter of approximately 50 cm.

Mid-transit



After the ingress phase, observers in the dome continued to observe the transit. Of course, observations were not conducted as diligently as during the ingress phase, as little of interest was expected to happen. Approximately half an hour after the ingress phase of the transit, the sky became noticeably hazy. Martin demonstrated the ability of haze to attenuate solar radiation by once more holding the industrial thermocouple at the focus of the Tomline Refractor: this time, the temperature topped out at a mere 505°C!

Throughout the transit, observers in the dome plotted on a large sheet of paper, attached to the projection screen, the progress of the silhouette of Mercury across the solar disk.

Figure 14 (below) shows their efforts. (Note, the projection is E-W reversed relative to the naked eye view.)

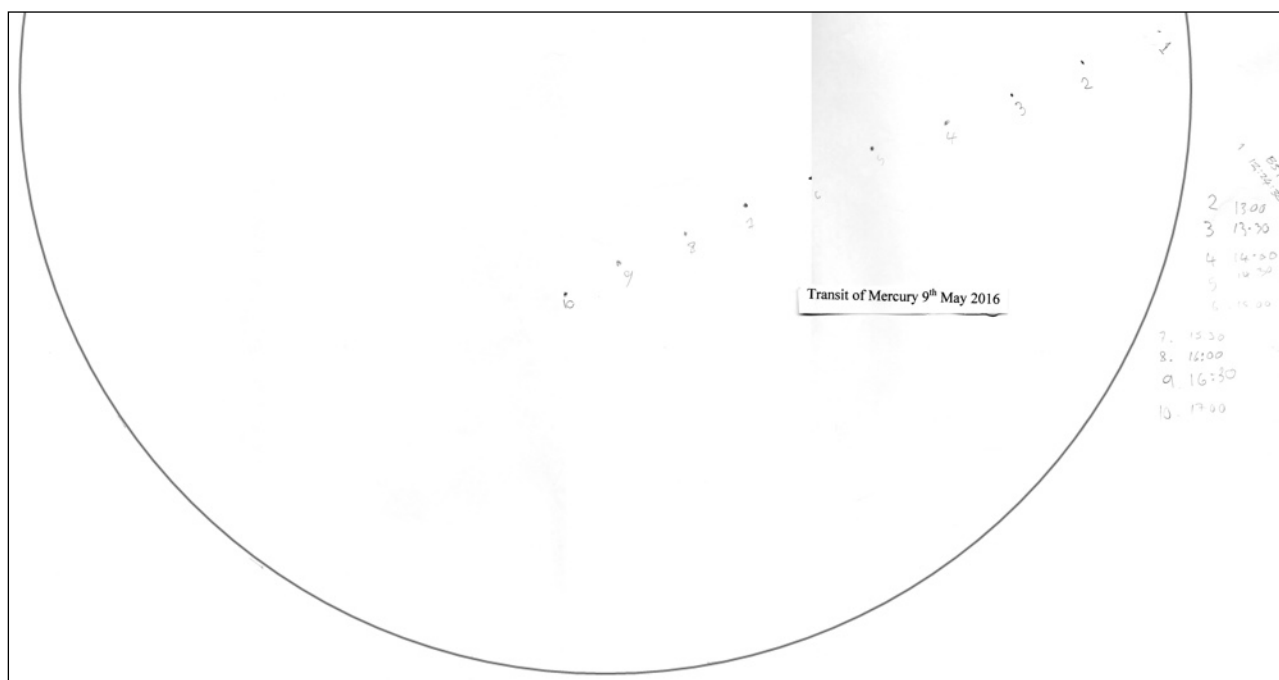


Figure 14: Plot of the transit

Chromatic Aberration

The OG of the Tomline Refractor is an unsophisticated doublet, manufactured by Merz in the early 1870s, comprising a crown glass and a flint glass. It provides colour correction at just two wavelengths (unlike modern multi-element OGs which provide colour correction at three or even four wavelengths) and is not of high quality by today's standards and, unsurprisingly, suffers from chromatic aberration.

Chromatic aberration was apparent in the projected image during the transit. It was visible to the eye, but was sometimes difficult to photograph, and sometimes easy, perhaps determined by the spectral response of the camera. The effect was radial, the black disk of Mercury exhibiting a green/yellow fringe on the circumferential arc closest to the centre of the image and a red/purple fringe on the diametrically opposite arc. In addition, the limb of the Sun was bordered by a yellow fringe and, beyond, a green/blue fringe. Off-line analysis of images afterwards, decomposing colour photographs into RGB components, revealed that green and red wavelengths were in focus, but blue was not.

Some photographs of the aberration are below. Figure 15, by Tina Hammond, using a Samsung mobile phone, at 11:14:22 UT (between 1st and 2nd contact), shows the

green and yellow fringe around both the solar limb and the limb of Mercury facing the centre of the image. Figure 16, also by Tina, at 11:16:59 UT, shortly after 2nd contact, shows clearly chromatic aberration around the entire limb of Mercury. Lindsay Hammond-Smith (last of the observers to arrive, *circa* 4.00pm) captured figure 17 at 16:03:00 UT, also showing chromatic aberration around the entire limb of the planet. At this time, Mercury appeared much closer to the centre of the disk so the aberration is less pronounced, and the sunshade was less effective, allowing more ambient light to enter the dome, so the image suffers from reduced contrast compared to those captured during the ingress phase.

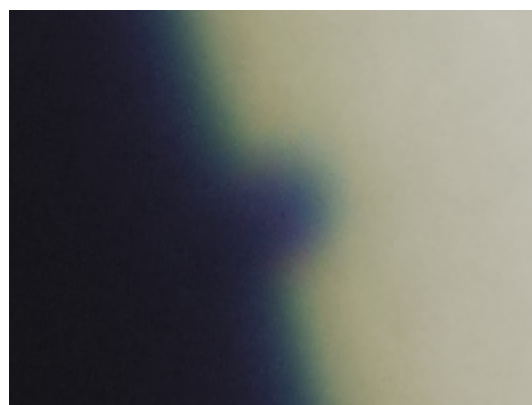


Figure 15: 11:14:22 (TH)



Figure 16: 11:16:59 (TH)

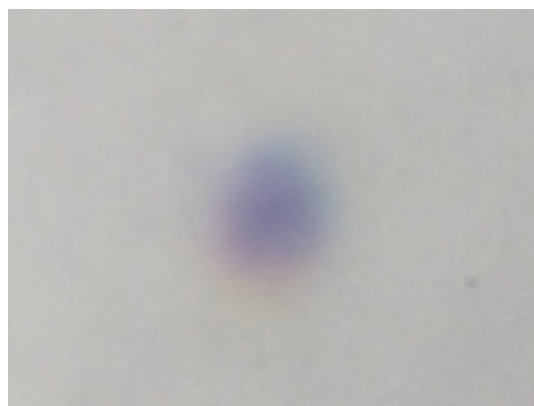


Fig. 17: 16:03:00 UT. (LHS)

End Of Observations

As the afternoon progressed, the sky became increasingly hazy and cloudy, although with some clear patches. At 5.00pm, thick cloud began rolling in and, by 5.15pm, the sky was overcast. Reluctantly, with no hope of further observations, the observers in the dome packed away the equipment. By 6.00pm, it was raining.

Note: Image credits above are as follows: JMA = James Appleton, MPC = Martin Cook, TH = Tina Hammond, LHS = Lindsay Hammond-Smith, ML = Matthew Leeks, DM = David Murton.

1.2 David Murton, On the South-West Balcony

David observed from the south-west balcony of the Observatory using two instruments as follows:

1. in H α light using a Coronado PST (Personal Solar Telescope) with Altair GPcamV2 IMX224 camera on a Skywatcher *Star Adventurer* mount,
2. in white light using a William Optics 71ED with Orion white light filter and Altair colour GPcam on a Skywatcher alt-az mount.

Figures 18-21 are images from the PST. Note the small prominence on the limb at the position of first contact.

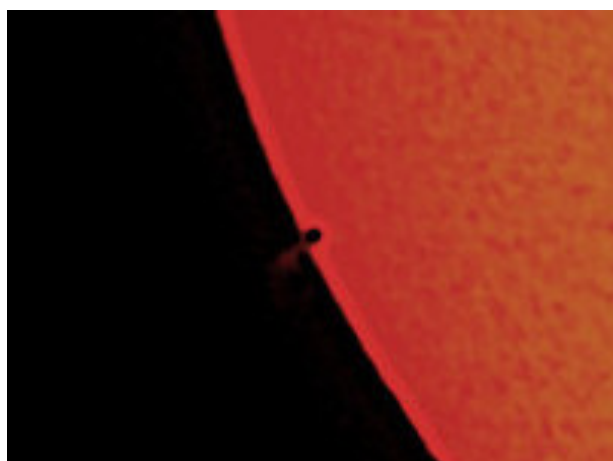


Fig. 18. 11:14:31 UT

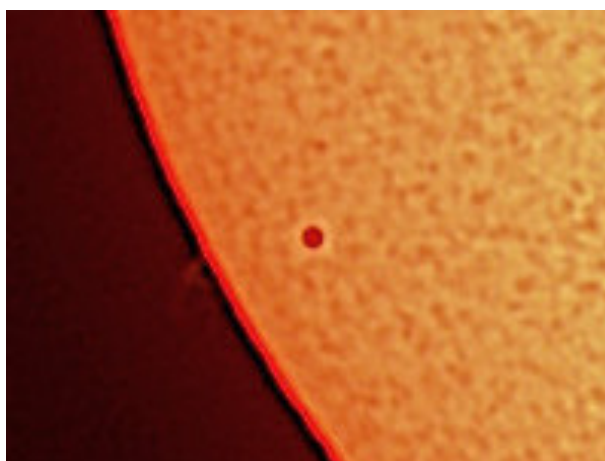


Fig. 19. 11:29:26 UT

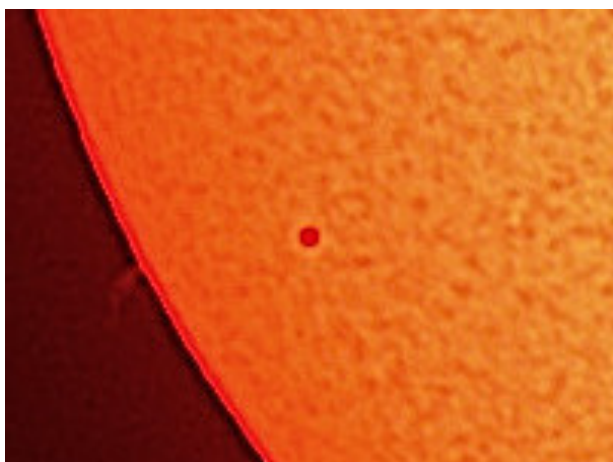


Fig. 20. 11:39:14 UT

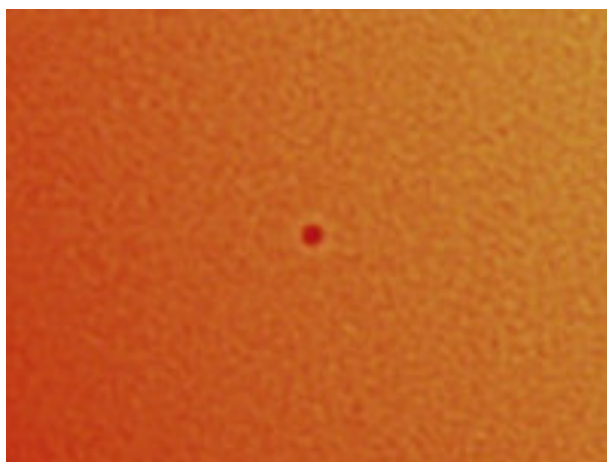


Fig. 21. 12:25:15 UT

Figures 22-23 are images from the 71ED.

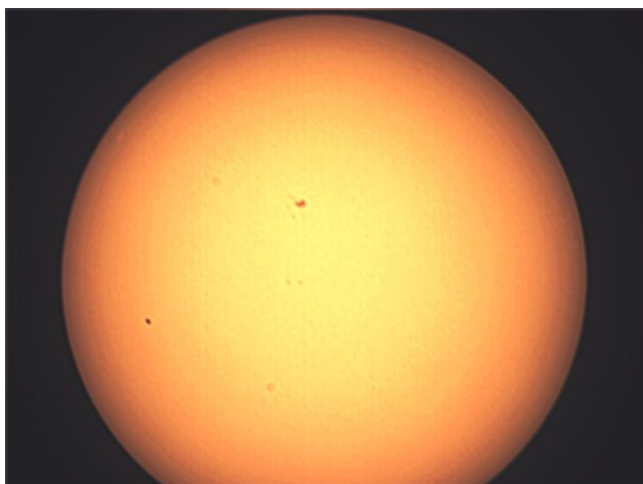


Fig. 22. 12:32:50 UT

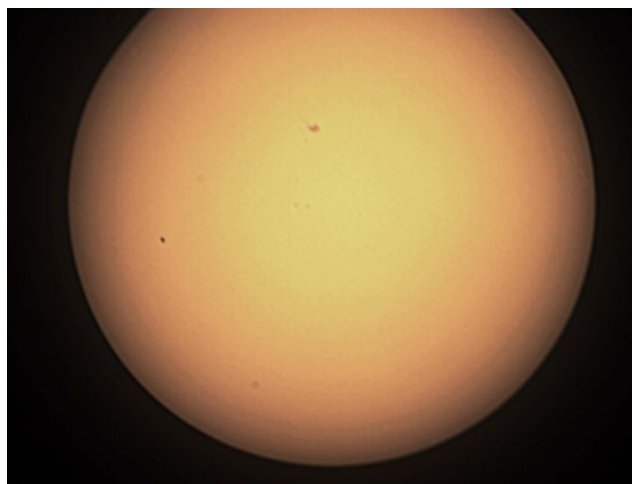


Fig. 23. 12:43:56 UT

1.3 Paul Whiting, FRAS, On the South Balcony

At 10.30am, Paul used a handheld scanner to tune in to a schools radio link with Major Tim Peake, orbiting some 400 km above in the International Space Station. The communication lasted a few minutes, during which Tim responded to a question posed by a pupil about time dilation.

After observing the ingress phase of the transit in the dome, Paul observed during mid-transit from the south balcony of the Observatory using a William Optics GT-81 with Nikon D3200 camera on Skywatcher mount. **Figure 24** shows an image captured in white light at 11:44 UT, 1/1600 s exposure at ISO 400.



Fig. 24. 11:44 UT

2 Andy Gibbs, Observing from South Ipswich

Location	Monmouth Close, South Ipswich.
Weather	sunny with cirrus cloud.
Equipment	QHY5 II L colour camera attached to Coronado PST on Sky-watcher <i>Star Adventurer</i> mount. Images captured using Firecapture v2.3 and Registax 6.

As I was due to start work late in the afternoon, I decided to observe the transit from home. With first contact due at 11.12, I hoped to collect images and data over a four-hour period. The day before, I performed a "dress rehearsal" to establish the best viewing position in the garden and to test the camera settings.

The morning of transit day began sunny and warm, although with some cirrus cloud. The BBC weather app predicted mainly sunny skies with increasing cloud cover and rain beginning at 7.00pm. I set up my equipment in the shade of my "observing shed" (figure 23) with an umbrella strategically placed over the laptop! By 11.00 UT, everything was set up and ready to go. The view of the Sun in $H\alpha$ at this time showed a low level of activity with one small sunspot, a few small prominences, a couple of large filaments and some areas of plage.

Unfortunately, I did not start recording images until 11:14:46 UT, shortly after 1st contact, so do not have a timing for this event. I estimate that 2nd contact occurred two seconds after I started recording, at 11:14:48 UT. There was a nice prominence visible at the point of ingress; this is well captured in figure 26, taken with an exposure set to highlight prominences.



The observing shed

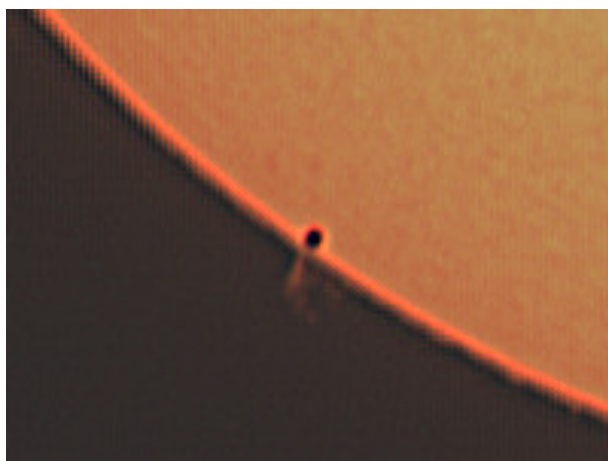


Fig. 26. Stack of images starting at 11:14:46 UT

I continued imaging at regular intervals for the next hour. I experimented with my camera settings, overexposing the disc of the Sun to give more contrast and to highlight the prominences. It was, however, becoming apparent that the high level cloud was becoming more of a problem, causing a "blooming" effect in some of the images. See figures 27 and 28.

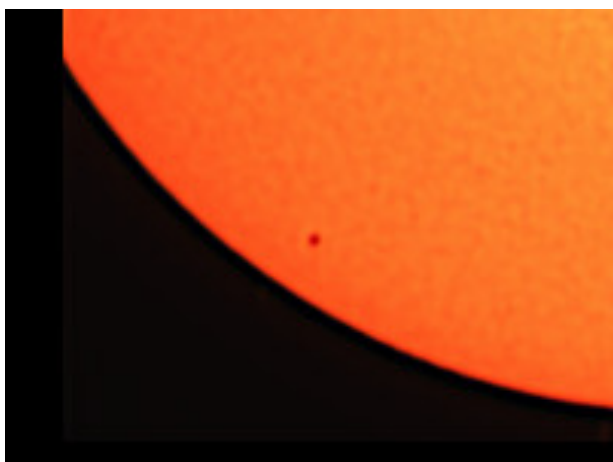


Fig. 28:11:45:37 UT

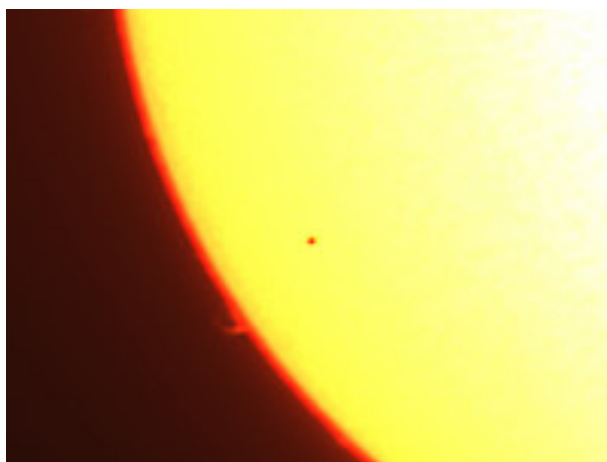


Fig. 27. 11:31:27 UT.

Thereafter, I took images occasionally through the transit: see [figures 29 and 30](#).

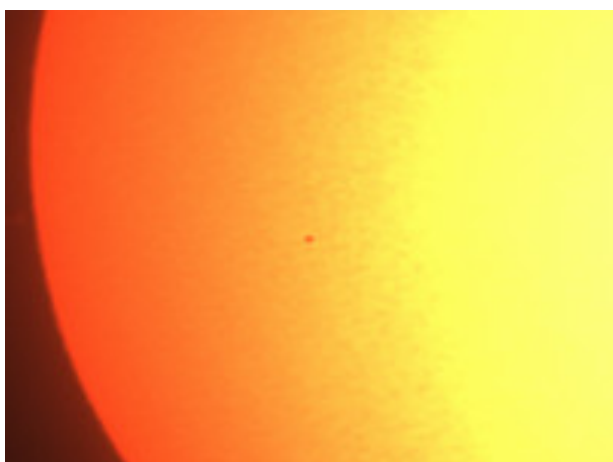


Fig. 29. 13:12:51 UT.



Fig. 30. 13:40:01 UT.

My neighbour arrived to view proceedings. She kindly loaned me a large parasol which was very welcome as the areas of shade in the garden were diminishing!

At 13.45 UT, cloud cover was becoming thicker and I took a break from imaging. I removed the camera from the PST and replaced it with an eyepiece. It proved still possible to view the transit visually.

By 14.20 UT, the sky began to clear so I re-inserted the camera, tweaked the settings to show more surface detail and, I would say, captured my best images- see figures 31 and 32.

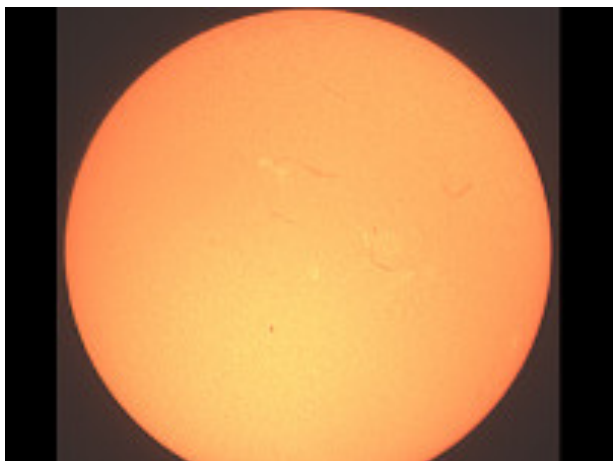


Fig. 31. 14:28:06 UT.

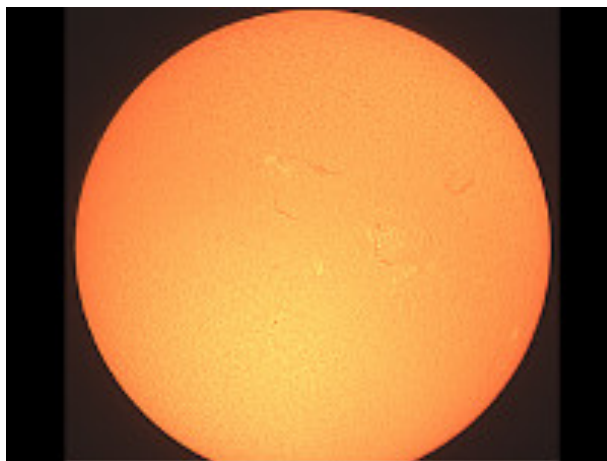


Fig. 32. 14:29:56 UT.

I recorded my last image at 14:37 UT, then packed away my equipment and got ready for work. By the time I left Ipswich at 17.15 UT, it had started to rain. However, it had been a successful observation.

3 Mike O'Mahoney, Observing From Felixstowe

Figure 33: a white light image taken at 15:04 UT using a 120 mm f7.5 refractor with Thousand Oaks Black Polymer White Light Filter. Canon D60a camera, 1/200 s exposure at ISO 200.



4 Alan Smith, Observing From Grundisburgh

I used the following equipment for observation and imaging:

- 1917 (World War I) military gun-sight, converted to DC electric motor drive in declination and stepper motor drive in RA, with a home made controller. Both motors powered by a rechargeable lead acid battery.
- Canon 1100D DSLR camera.
- Tokina 60 mm OG, 400 mm FL, f6.3 telephoto lens (with 3x converter), set to f22 and using a Mylar lens cap. Exposure set to 1/400 s at ISO 100.
- Direct imaging to laptop PC.

Observations made from Grundisburgh, IP13 6RE.

I started imaging at around 10:00 UT with occasional exposures. During the ingress phase, from 11:12:02 to 11:16:08 I used an interval timer to capture an image with the D1100 every 2 seconds (nominal). From 11:20 to 16:38, with the silhouette of Mercury clear of the limb, I captured an image every 5 minutes (nominal), except at the end of the period. Finally, disappearance of the Sun and Mercury behind a fir tree coincided with the arrival of dense cloud cover and I terminated observations at 16:40 UT. In a spirit of optimism, I left the equipment in place, hoping for a break in the clouds, until it started to rain at 18:15 UT.

A heat haze badly affected the images; this was particularly apparent in undulation and movement of the solar limb. As a result, I found it difficult to estimate the instants of 1st and 2nd contact. My estimates are: 11:12:52 and 11:15:34 UT respectively. The teardrop effect was very pronounced around 2nd contact, probably because of poor seeing. Figure 32, a montage of images from the D1100 from before 1st contact to after 2nd contact (specifically 11:12:46 - 12:16:08), shows the silhouette of Mercury initially appearing out of undulations on the solar limb, and the development of the teardrop effect.

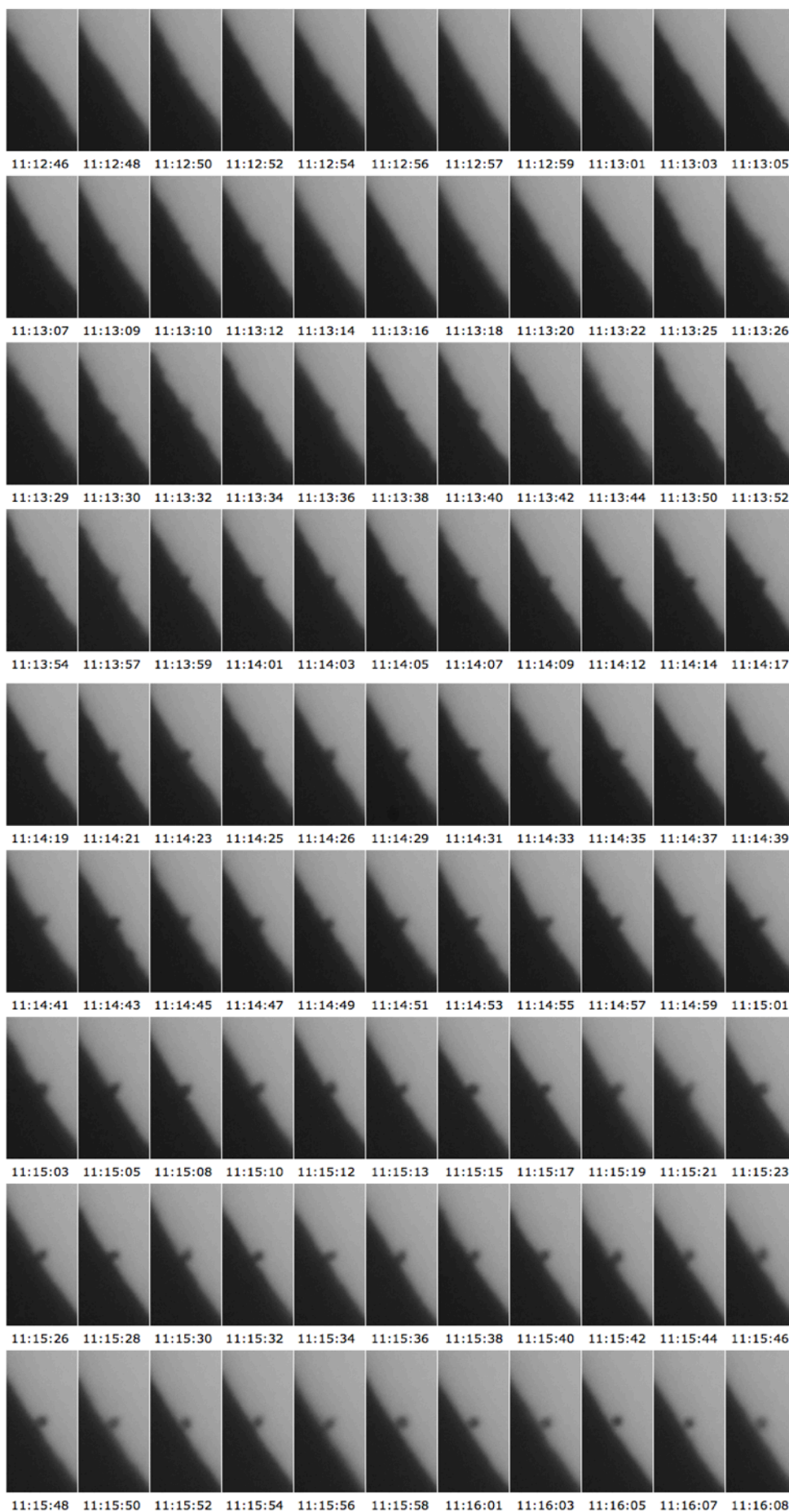


Fig. 34. Images taken approximately every 2 s during ingress.

During mid-transit, high-level cirrus clouds created a full solar halo (figure 35). There was a fair easterly breeze, which I deflected from my equipment with appropriately-placed wind-breaks (figure 36).



figure 36: The observing equipment protected from the breeze.



figure 35: Solar halo

Throughout the day, I used a solar panel to estimate the intensity of solar radiation.

Figure 37 shows the results: the graph of intensity is scaled in Watts, reflecting the power delivery of the solar panel. The underlying, approximately bell-shaped, curve is subject to a large number of relatively high-frequency troughs associated with the passage of cloud.

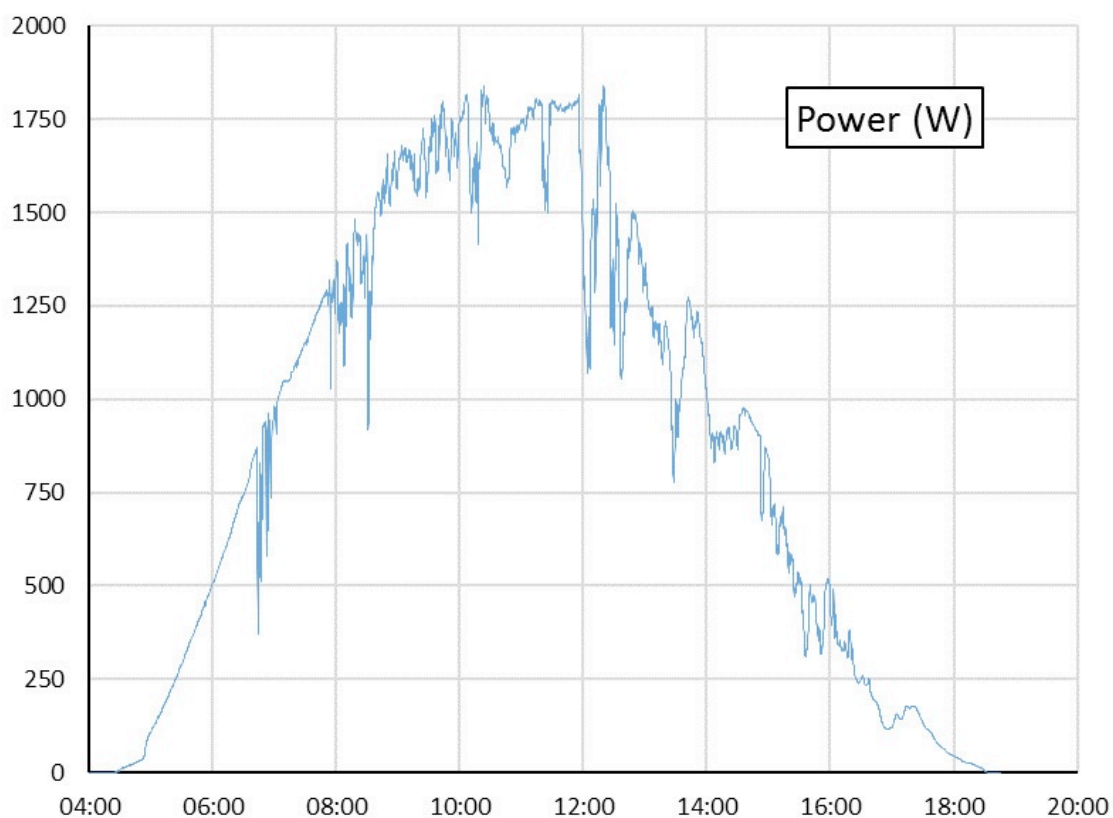


Figure 37: Variation in solar intensity during the transit.

The following link is an animation of the transit compiled from images captured by the 1100D.

http://www.oasi.org.uk/Obsvns/20160509_ToM/20160509_ToM_AJS.gif

5 Nigel Evans, Observing From North Ipswich

Video link

http://www.oasi.org.uk/Obsvns/20160509_ToM/20160509_ToM_NE.mp4

6 Neil Short, Observing From Chelmsford

It's 09 May and I know full well that it's the day of the transit of Mercury. Unfortunately, I'm at work and there's a lot of cloud in the sky. Fortunately, an *Understanding Company* allows me to race home at lunch-time and out into the back garden with my 80 mm refractor (with appropriate solar filter fitted, of course) and an 8-28 mm zoom eyepiece.

My technical skills allow me to take astro-photos by the simple method of pointing my camera down the eyepiece! I had to hand three cameras - a Canon 100D, a Canon HS50 and a Nikon Coolpix S6400 – each with different degrees of suitability to the task. Figures 39 - 42 show the results of my afternoon in the garden. All were obtained with the camera set to "auto".

My observations were curtailed by a combination of cloud coverage around 4.00pm (approximately half-way through the transit) and an interest in making the most of my afternoon off to see some of the Essex vs Sri Lanka cricket match!

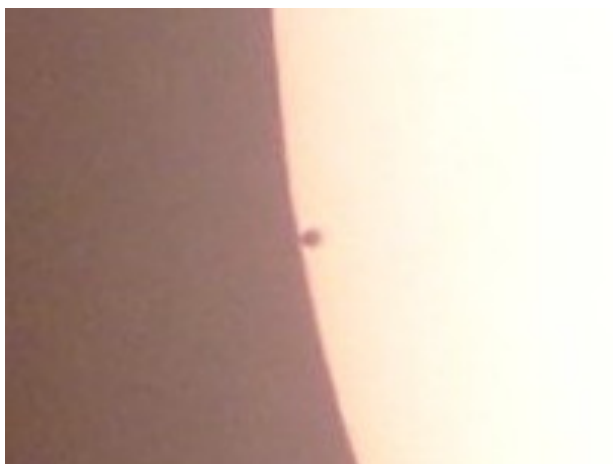


Fig. 39. 2nd contact. Canon 100D.

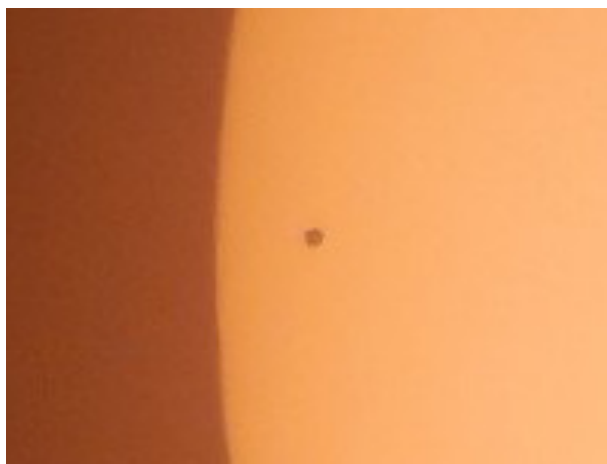


Fig. 40. Mid-transit. Nikon S6400.



Fig. 41. Mid-transit. Canon HS50



Fig. 42. Mid-transit. Nikon S6400

7 Gerry Pilling, Observing From Martlesham

The good weather on 09 May encouraged me to take out my ETX 125 PE and use it for the day. I used a 40 mm Fullerscopes eyepiece and drew power from a portable battery pack. I used the Sun-finder to align the instrument.

Unfortunately, I encountered some problems at first. Stray light in the eyepiece tube gave the impression that the solar filter was damaged, and I therefore hesitated to use it. In fact, the filter turned out to be OK but, by the time I had established this, I had missed 1st and 2nd contact. Mrs P and I then observed the slow progress of the black dot of Mercury across the face of the Sun until cloud terminated observations. Mercury appeared like a very tiny speck indeed.

The telescope has recently been repaired. It tracked Mercury very accurately, so the repair was worthwhile.

Figures 43 and 44 show the telescope and Sun-finder.



Fig. 43. The ETX-125



Fig. 44. Close-up of Sun-finder.

8 Additional Notes

1. All images above are shown in approximately naked-eye orientation; this has necessitated some being rotated/flipped.
2. By default, times are expressed as UT above. However, a few times are more naturally expressed as civil time, and these are clearly indicated as e.g. 9.30am or 4.00pm. Civil time was one hour ahead of UT on 09 May 2016.

Compiled by James Appleton

Congratulations to James on the publication in the BAA Journal of his paper "Rømer Revisted" (June 2016, 126, #3, pp139–148) Ed.

Rocketman

By Mike Whybray

On 9th June a man was seen unloading various dangerous looking projectiles and rockets from the back of a car in Newbourne. But no need to worry, it was just Rod 'Rocket' Stevenson arriving to give a talk about the activities of the East Anglian Rocketry Society and his own experiences in this field. Rod is a part time teacher and part time rocket man. He had been lucky enough to be invited as a teacher to visit NASA to train up on rocketry principles and visit amazing places such as the vast build hanger for shuttle launches, and now passes on his enthusiasm to school children and to the public in general. He related some of the history of amateur rocketry in the UK including the enterprising nature of the Paisley Rocketeers founded in 1935 who went on to send mail by rocket as a way of raising funds.



Rod described how the common rocket motors work - either 'slow' burning gunpowder or ammonium perchlorate plus aluminium - in a tube with a nozzle, and how the motor rating system works with a grading of A,B,C etc with the motor power doubling for every letter of the alphabet. In the first photograph you can see a range of rocket motor sizes (from A upwards) on the table and two standing in front of it. In the second photograph you see the scaled down V2 rocket which Rod has successfully flown. It uses an on-board computer to manage the flight including taking continuous air pressure measurements to monitor and record progress and deploy the parachute.



Some of Rod's rockets including a scaled down German V2 which has successfully flown.

Rod had several great videos of his own and other amateur rockets taking off including an amazing Saturn V5 1/10 scale replica from the USA, and a Reliant Robin converted into a space shuttle look-alike for a Top Gear programme! There was a lively question and answer session and from the detailed questions about DIY nitrous oxide hybrid rockets from some members I wouldn't be surprised if we see a few rocket launches from Newbourne at some point in the future. A very interesting evening and as EARS allow free entry to their roughly monthly launch days near Cambridge there was high interest in an OASI outing to view some launches.

Their website is <http://www.ears.org.uk>

They are also on Facebook

Web links

<http://spaceweather.com>

News and information about the Sun-Earth environment

<http://www.webbdeepsky.com>

Webb Deep-Sky Society

<https://www.calsky.com>

Observation data for your location

<http://adswwww.harvard.edu>

The SAO/NASA Astrophysics Data System (ADS). The ADS maintains three bibliographic databases containing more than 12.0 million records covering publications in Astronomy and Astrophysics, Physics, and the arXiv e-prints. **Please note that all abstracts and articles in the ADS are copyrighted by the publisher, and their use is free for personal use only.**

<http://arxiv.org>

Open access to 1,157,362 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics

Radio astronomy - for the unhurried observer

Martin Richmond-Hardy

Clouds? Pah! You can observe the effects of the sun even on the darkest of days.

The BAA Radio Astronomy section <http://www.britastro.org/radio/> has a commercial arm UKRAA – the UK Radio Astronomy Association[1] was set up in 2008 with the support of the Radio Astronomy Group of the British Astronomical Association to handle the development and sale of radio astronomy equipment developed by the BAA RAG. They sell some simple kit to get you going in radio astronomy.

VLF Receiver

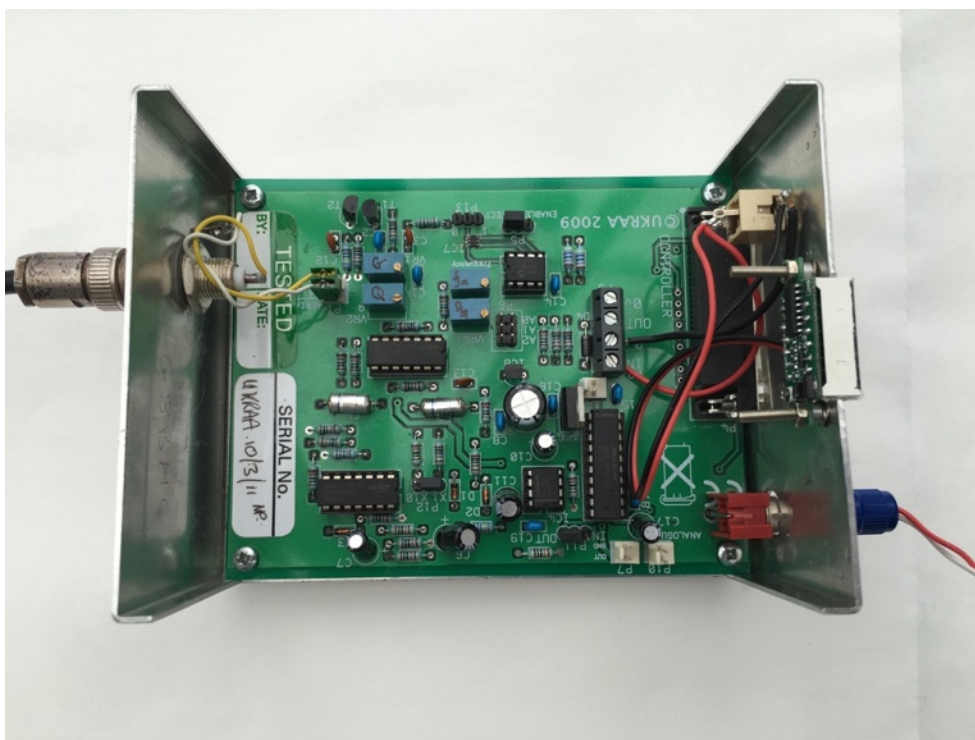
There are a number of very low frequency (VLF) transmitters around the world [2], the signals from which can be used to monitor the effects of the sun on the Earth's ionosphere.

The UKRAA Very Low Frequency (VLF) Receiver is designed to indirectly record Sudden Ionospheric Disturbances (SIDs) induced by solar flares.

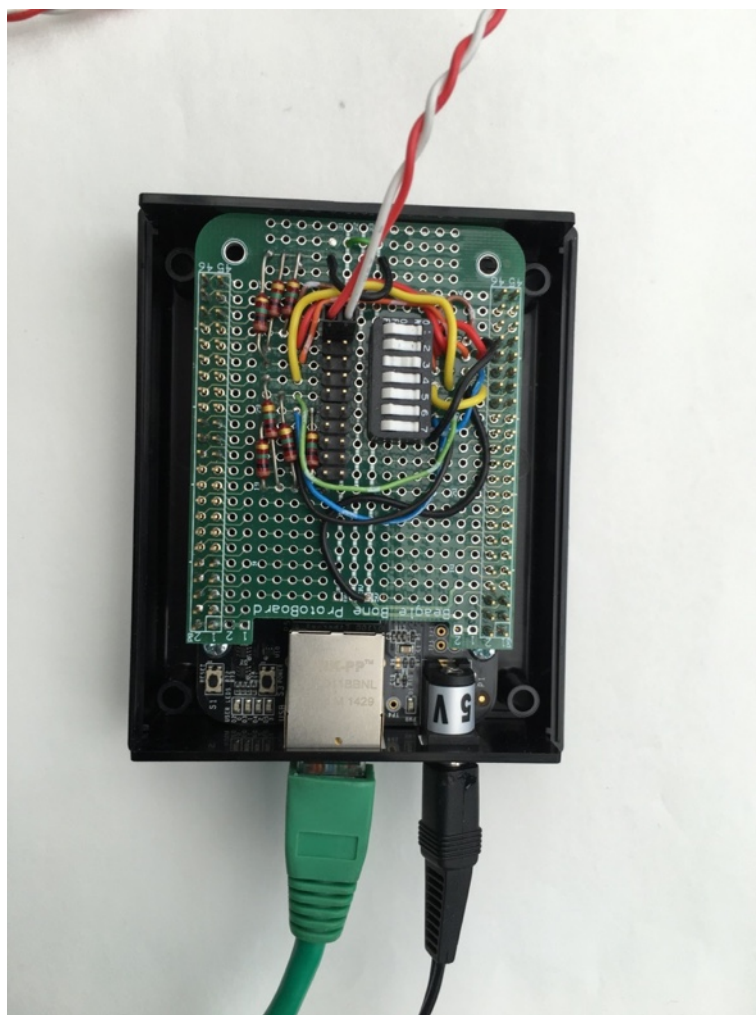
It does this by monitoring transmissions from Earth-based beacons, which are affected by changes in the ionosphere, giving an indication of events on the Sun.

The main motivation for this work is to correlate the radio observations of solar activity with those from optical observatories, and to follow the cycle of sunspots as they appear.

You can buy a VLF receiver ready built in a fancy box (above) or build your own as I have done.



UKRA VLF receiver, home-built



The output of the VLF receiver is a measure of the signal strength, not the demodulated signal, so you need a means of recording this. I use a BeagleBone Black microcomputer [3] running a 6-channel logging application being developed by one of the development team associated with UKRAA. This makes use of the onboard A/D converter of the BeagleBone Black. My home-brew "cape" shown in the picture connects the 6 analogue ports either to ground (for unused ports) or to the input connector with 1Mohm resistor to ground. NB the BBB can handle from 0 to 1.8V maximum on it's A/D ports.

The logger can be located remotely and is accessed via the Ethernet connection using another in-development application running (in my case) on an iMac, but there are also Windows and Linux versions.

Useful transmitters are listed below (there are more). I use Rhaderfehn on 23.4kHz.

More details of the UKRAA VLF receiver are available at Ref. 4.

Call sign	Notes	Frequency (Hz)	Location	Latitude	Longitude
GBZ		19600	Anthorn, UK	N 54° 54' 41.91"	W 003° 16' 42.44"
ICV		20270	Isola di Tavolara, Italy	N 40° 55' 23.26"	E 009° 43' 51.64"
FTA	5	20900	Sainte-Assise, France	N 48° 32' 40.68"	E 002° 34' 45.94"
HWU	6	18300	Rosnay, France	N 46° 42' 47.26"	E 001° 14' 42.89"
		21750			
		22600			
GQD	7	22100	Skelton, UK	N 54° 43' 54.48"	W 002° 52' 58.92"
DHO38	8	23400	Rhaderfehn, Germany	N 53° 04' 44.04"	E 007° 36' 54.00"

5 Transmissions of FTA and HWU are mutually exclusive.

6 Transmissions of FTA and HWU are mutually exclusive. HWU alternates between 18.3kHz, 21.75kHz and 22.6kHz.

7 Location of GQD uncertain: Anthorn or Skelton.

8 Off-air daily from 7:00 to 8:00 UTC.

References

1 UKRAA's web site <http://ukraa.com>

2 VLF transmitters <http://sidstation.loudet.org/stations-list-en.xhtml>

3 BeagleBone Black <https://beagleboard.org/black>

4 UKRAA VLF Receiver manual
http://ukraa.com/user-manuals/vlfreceivermanual_v3-pdf?format=raw

Christchurch Park Solar Observing 28/29 May

Photo by Mike Nicholls



Saturday was fairly quiet with intermittent sunshine but we had over 250 people there on Sunday. Present were:

Saturday		Sunday	
Name	Scope	Name	Scope
Bill Barton	Refractor + white light filter	Bill Barton	Refractor + white light filter
Mike O'Mahoney	Refractor + white light filter		
David Murton	H α PST	David Murton	H α PST
Andy Gibbs	H α PST	Andy Gibbs	H α PST
Paul Whiting	H α PST	Paul Whiting	H α PST
Roy Gooding	Refractor + white light filter	Roy Gooding	Refractor + white light filter
Martin R-H	200mm Newt + white light filter		
Tina Hammond			
Mike Nicholls			
Joe Startin			
Mike Norris			



The sun from our solar event in Christchurch park Ipswich. Interesting feature at five o'clock giving a crater effect.

PST and Altair GPCAMV2 IMX224 camera.

Photo by David Murton

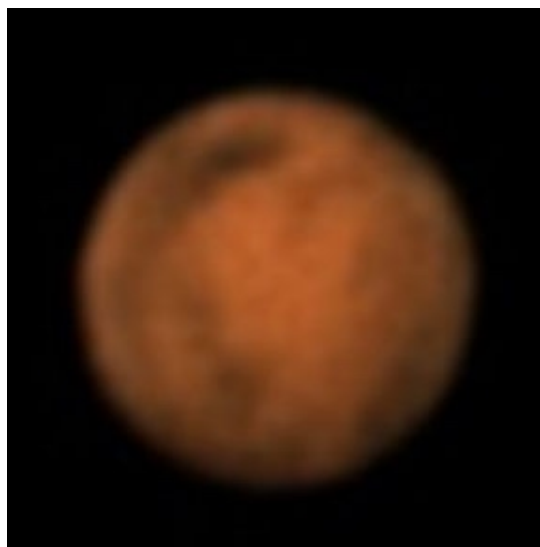
Astrophotography Day at Woolpit

David Murton

In conjunction with Mark Hunter of the East Anglian Astrophotographers Facebook group we organised a get together for all of us East Anglian astro photographers, whether we be members of societies or we prefer to observe independently.

The date was 4th June and the venue was Mark's house near Woolpit.

Excellent weather.



Mars



ISS flying past Jupiter

See also page 11.



Iridium flare under The Plough