No. 499 Registered Charity 271313 August 2014

OASI News

The newsletter of the Orwell Astronomical Society

The Annual OASI Barbecue at Newbourne on 19 July

Trustees: Mr Roy Adams Mr David Brown Mr David Payne

Honorary President: Dr Allan Chapman D.Phil MA FRAS

John Wainwright

Joe Startin

Bill Barton enjoying a spot of solar observing at the OASI BBQ

... and while the Safety Officer isn't looking, lets make some hydrogen!

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Society Contact details

Observatory (meeting nights only) 07967 519249

Email queries: info@oasi.org.uk

facebook.com/pages/orwell-astronomical [*]

Twitter: @OASIpswich

Forum: forum.oasi.org.uk/index.php

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, The code for the gate, is on the back of your membership card. If the Black door entrance at the base of the observatory tower is locked, please phone the observatory mobile, 07967 519249 during meeting hours.

We now have a key to the toilets in the school gym. It 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, rtfd, doc, docx, odt, Pages
Spreadsheets: xls, xlsx, OpenOffice/LibreOffice, Numbers
Images: tiff, png, jpg

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

The Newsletter

We now use an outside printer. The cost of doing so means that only the cover pages can be printed in colour. The full colour version is available from the OASI Yahoo group and from the editor's Dropbox.

To receive the electronic version of the newsletter (which you can also print in A4 or A5 booklet format) you may either:–

- Subscribe to the OASI Yahoo group by emailing oasi-subscribe@yahoogroups.com
- Or, for those who don't like Yahoo, a Dropbox link will be emailed to those who have expressed a wish to receive the e-version. Email membership@oasi.org.uk

Newsletter archive on DVD

James Appleton

The electronic archive of OASI *Newsletters* is complete from edition 1 (February 1972) to edition 484 (April 2013) inclusive. The archive contains a scan of every non-blank page of the *Newsletter* and an index. The spreadsheet facilitates locating articles by keyword searches using the Excel *Find* function. The archive can now be searched online at www.oasi.org.uk/NL/NL_form.shtml

A DVD containing the archive is in the OASI library for loan to members. Anybody wanting their own copy, please let me know what format your require – DVD or your own memory stick.

Committee 2014

Chairman	David Murton	Chair committee meetings, represent OASI to external bodies
Secretary	Roy Gooding	Respond to enquiries, Press & publicity, Outreach meetings, Open days
Treasurer	Paul Whiting FRAS	Finance, Visits by outside groups, Supervision of applications for grants, Taster evenings, Public appreciation of astronomy.
Committee	James Appleton	Web site
	Bill Barton FRAS	Safety & security
	Martin Cook	Membership, Tomline refractor maintenance
	Tina Hammond	Librarian
	Peter Richards	Lecture meetings, Email distribution lists
	Martin Richmond-Hardy	Newsletter
	John Wainwright	Equipment curator
	Mike Whybray	Workshops
	Mike Norris	Newbourne Observing Group

Society Notices

Committee Meeting Tuesday 29th July

Venue Shepherd and Dog, Nacton

Time: 20:00 to 22:00

This meeting is open to any member who wishes to come along

Welcome to New Members

Richard Pawsey

Contacts

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

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

Society Events Diary

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

Google Calendar

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

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
Discussion Forum	http://forum.oasi.org.uk/index.php

Date and Time	Location	Contact	Event
Weekly, every Wednesday, 20:00	Orwell Park Observatory	Martin Cook, Roy Gooding	General observation (weather permitting) using a variety of telescopes.
3 August Time TBC	Felixstowe Leisure Centre	David Murton	**Public access event.** Observing the sun safely. Booking not necessary.
Friday 8 August 19:30	Suffolk Wildlife Trust, Farm	Roy Gooding	**Public access event.** Suffolk Wildlife Trust Bio Blitz
Monday 11 August 20:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.
Sunday 24 August 11:00 - 16:00	Alnesbourne Priory	Mike Norris	**Public access event.** Observing the sun safely. Booking not necessary.

Date and Time	Location	Contact	Event
Sunday 31 August	Bentley Playing field	David Murton	Solar event at Bentley Families Day
Monday 8 September 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.
Friday 12 September	Westbourne Library	Paul Whiting, FRAS	**Public access event.** Telescopes and talk evening. Details TBC.
Monday 22 September 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.
Friday – Monday 19-22 September or, if poor skies in Sept: Friday-Monday 24-27 October	Haw Wood Farm Caravan Park, Hinton, Saxmundham IP17 3QT www.hawwoodfarm.co.uk	www.brecklandastro.org.uk/	Breckland Astronomical Society Autumn Star Party
22Sept – 3 Oct Main weekend 26-28 Sept	Kelling Heath	starparty.las-astro.org.uk	Autumn Equinox Sky Camp
Saturday 4 October 19:00 to 2:00	Bentley Playing field	David Murton	Bentley Village Star Party Option 1 (option 2 is 29 Nov)
Tuesday 7 October	Orwell Park Observatory	Paul Whiting, FRAS	**Public access event.** Observatory tour. Places must be booked. Further info and book a place.
Monday 13 October 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.
Tuesday 21 Oct	Orwell Park Observatory	Gerry Pilling	Small Telescope Observing Night
Friday 24 October, 20:00	Methodist Church Hall, Black Horse Lane, Ipswich	Pete Richards	Lecture Meeting. Prof Ralph Spencer: Black Swans - Black Holes in the Constellation Cygnus. [postponed from May]
Monday 27 October 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.
Saturday 01 November Time TBA	TBA	James Appleton	Field trip to observe grazing lunar occultation of the magnitude 7.1 star Hip 109637.
Tuesday 4 November	Orwell Park Observatory	Paul Whiting, FRAS	**Public access event.** Observatory tour. **Places must be booked.** Further info and book a place.
Monday 10 November 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.

Date and Time	Location	Contact	Event
Tuesday 18 Nov	Orwell Park Observatory	Gerry Pilling	Small Telescope Observing Night
Friday 21 November 2014, 20:00	Methodist Church Hall, Black Horse Lane, Ipswich	Pete Richards	**Lecture Meeting.** Alan McGuire – Using the Sloan Digital Sky Survey to Study Quasars and the Early Universe.
Monday 24 November 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.
Saturday 29 November 19:00 to 20:00	Bentley Playing field	David Murton	Bentley Village Star Party Option 2
Tuesday 2 December	Orwell Park Observatory	Paul Whiting, FRAS	
Monday 8 December 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group.
Wednesday 10 December	TBC		Christmas meal
Tuesday 16 Dec	Orwell Park Observatory	Gerry Pilling	Small Telescope Observing Night
Monday 22 December 19:00	Newbourne Village Hall	Mike Norris Mike O'Mahony	Newbourne Observing Group. Christmas Meeting
Monday 29 December Time TBS	TBA	James Appleton	Field trip to observe grazing lunar occultation of the magnitude 6.6 star 88 Psc.
2015			
Tuesday 20 Jan	Orwell Park Observatory	Gerry Pilling	Small Telescope Observing Night
Wednesday 11 February **2015**	North Norway	Paul Whiting, FRAS	OASI aurora observing field trip to northern Norway, 11-16 February 2015. Further details on web site and p15
Tue 17 March 2015 20:00	Orwell Park Observatory	Gerry Pilling	Small Telescope Observing Night
Tue 07 April 2015 20:00	Orwell Park Observatory	Gerry Pilling	Small Telescope Observing Night

Newbourne Observing Group

michael.norris17@btopenworld.com omahony.mike@gmail.com

We meet at The Newbourne Village Hall, Mill Lane, Newbourne, 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.

Only one meeting in August on the 11th, starting at 8pm

September Meetings on Monday 8th & 22nd September from 7pm.
All welcome, with or without telescopes.

David Murton, OASI Chairman

Small Telescope Observing Nights (STONs)

By Gerry Pilling

These will resume in October at Orwell Park Observatory.

Oct 21 2014	Jan 20 2015
Nov 18 2014	Feb 17 2015
Dec 16 2014	March 17 2015 (St Paddy's Day!)
	Apr 7 2015

Lecture Meetings

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

8pm Friday 24th October 2014

Professor Ralph Spencer (University of Manchester)

Black Swans – black holes in the constellation of Cygnus

8pm Friday 21st November 2014

Alan McGuire

Using the Sloan Digital Sky Survey to study Quasars and the early Universe

Outreach Meetings for 2014

Contact: Roy Gooding

Suffolk Wildlife Trust Bio Blitz Event Friday 8th August

This is at Foxburrow Farm in Melton

Full programme for Friday

18:00	Walk to include setting up small mammal, hedgehog, moth, pitfall and camera traps.
18:00 to twilight	pond dipping.
20:00	bat walk and owl calling.
20:30	star gazing with the Orwell Astronomical Society

The events program has our contribution to the day starting at 20:30. If it is clear, no observing will start until at lest an hour later.

Please arrive from around 19:00 onwards.

We may have to survey the farm for the best observing location closest to the car park. There are many mature trees around the farm.

Saturn will be visible low down in the western sky, but the skies may still be too light to observe it.

Directions to Foxburrow Farm

Turn 1st right after the Melton roundabout on the A12

Then turn 1st left.

The farm is signposted

www.suffolkwildlifetrust.org/discover-learn/schools/our-reserves-and-centres/foxburrow-farm

Bentley Playing Field

A solar event. The playing field is at the bottom of Case Lane.

https://www.google.co.uk/maps/@51.9916497,1.0696197,17z

The Bentley Family Fun Day is on Sunday 31st August at 11am till 3pm.

Set up time is any time after 09:30

Bentley Star Parties

Option 1 : Saturday 4th October 19:00 to 21:00. Set-up from 18:00

Option 2 : if 4 Oct is cloudy :Saturday 29th November 19:00 to 21:00

The star parties will be open any villages who wish to come along.

If you have any questions about the above outreach meetings please contact Roy.

Westbourne Library

Friday 12 September details TBC

Sutton Hoo

Through our Twitter feed @OASIpswich we have received an invitation from the National Trust at Sutton Hoo. to stage an event. Basil Brown was also an astronomer.

Darsham

Some members of the Darsham society, DASH Astro dash.moonfruit.co.uk,have set up a serious observing email group. The intention is to arrange observing sessions at local dark sky sites such as Walberswick and Shingle Street, etc. If you are interested in joining, let me have your email address and I will get you added to the list.

David Murton

OASI Discussion Forum

A web-based forum for general discussions and some initial specialist areas.
OASI members can join this forum at forum.oasi.org.uk/index.php

- OASI General
- Newbourne Observing Group
- Observing - Night Sky
- Observing - Solar
- Events
- Imaging
- Small Telescopes Observing Nights
- For Sale / Wanted
- Equipment

Some Astronomy Guides

The One Minute Astronomer	oneminuteastronomer.com/
Stargazers lounge	stargazerslounge.com/
Society for Popular Astronomy	www.popastro.com/index.php
UK Astronomy Directory	www.uk-astronomy.co.uk/directory/
Meteor Watch	www.meteorwatch.org/
Heavens Above (satellites, astronomy & time data)	heavens-above.com/
Metcheck forecast	uk.metcheck.com
Weatherweb	www.weatherweb.net
Astronomy weather forecast	clearoutside.com/forecast/52.06/1.15
Lightning	www.lightningmaps.org/realtime?lang=en

The Night Sky in August

Roy Gooding & Martin RH

Moon

1st Quarter	Full Moon	Last Quarter	New Moon
04 August 01:50	10 August 19:09	17 August 13:26	25 August 15:13

Times are BST (UTC+1) at Orwell Park Observatory.

Sun and planets

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

Object	Date	Rise	Set	Mag.	Notes
Sun	1	05:17	20:45		
	31	06:05	19:45		
Mercury	1	04:28	20:28	-1.3	Mercury is too close to the sun this month to be observed. In Orion moving into Virgo. Superior conjunction Aug-08.
	31	07:59	20:12	-0.2	
Venus	1	03:19	19:34	-3.7	Venus is visible in the early morning sky. In Gemini moving into Leo.
	31	04:41	19:19		
Mars	1	13:30	23:04	0.5	Mars is visible in the western sky. In Virgo moving into Libra.
	31	13:16	21:42		
Jupiter	1	04:49	20:27	-1.6	Jupiter is now back in the early morning sky in Cancer
	31	03:28	18:45		
Saturn	1	14:32	23:54	1.1	Saturn is presently in Libra, visible in the western sky.
	31	12:41	21:58		
Uranus	1	22:45	11:46	5.8	In Pisces
	31	20:46	09:45		
Neptune	1	21:39	08:00	7.8	In Aquarius. At opposition Aug-29.
	31	19:40	05:57		

Meteor Showers

Source: BAA Handbook 2014 p95-7

Shower	Limits	Maximum	ZHR
α-Cygnids	July – August	July 21 Aug 21	5
δ-Aquarids	July 15 – Aug 20	July 29 Aug 6	20 10
Piscis Australids	July 15 – Aug 20	July 31	5
Perseids	July 23 – Aug 20	Aug 13	80+
α-Capricornids	July 15 – Aug 20	Aug 2-3	5
ι-Aquarids	July – August	Aug 6	8
Piscids	Sept – October	Sept 9 Sept 21 Oct 13	10 5 ?

Occultations during August

James Appleton

Date	Time (UT)	D/R	Lunar Phase	Sun Alt (d)	Star Alt (d)	Mag	Star
05 Aug	21:40:14	D	0.69+	-15	13	7.1	ZC 2345
08 Aug	21:01:14	D	0.95+	-12	19	3.9	44 Sgr,rho 1 Sgr
	22:05:50	R		-18	20		
21 Aug	03:47:42	D	0.17-	-9	24	5.2	26 Gem

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.

The day I met Colonel Tomline …

A review of the Felixstory – a Dramatic Promenade

Paul Whiting FRAS

Following the last minute email from Martin, I booked myself a ticket to go and see this unusual dramatic presentation, which presented various scenarios from Felixstowe's rich history, starting with an interview with George Tomline and his rivalry with Thomas Cobbold. There was also a promise of a trip in a 1960s bus to visit different venues around the town. The disappointment was that if I had gone on the opening day the transport would have been a 1929 charabanc, unfortunately the OASI barbecue got in the way. However fortune shone and the 1929 charabanc was also on the road on the Sunday.

So the dozen or so viewers started at the Orwell Hotel, in his Lordship's Library, where we met Col. Tomline in an interview with Felixstowe photographer Charles Emeny. Tomline, I have to say, was portrayed as being a right miserable sod. However everything he said was, as far as I know, factually correct (Phil Hadwen, the Felixstowe historian had a hand in the script). He even discussed his observatory and how he planned to spend his retirement looking at his beloved heavens. No mention of Plummer.

From the Orwell Hotel we travelled by Buckland's charabanc to the Spa Pavilion (outside) – umbrellas were provided, because at this point the hailstones came down. After a few seaside songs on the beach, we were given a recital of a poem written by John Betjeman about Felixstowe, by the author himself.

Then a small prom along the prom to hear from the architect of the Bartlett hospital and how the nurses used to frolic in the sea from the early beach huts. Further along the prom we met Wallis Simpson (as in Edward VIII) and how she had to live in Felixstowe for 6 weeks awaiting her divorce.

Then to the war memorial to hear from a soldier who lost his life in the trenches.

Further on to the Town Hall, where we sat in the council chamber to hear a recreation of the trial of the suffragettes who burnt down the Bath Road Hotel.

Back on the bus to Landguard Fort, where we met Watson-Watt and his assistant Skip Williams talk about radar. Then in to the RAF room at the Fort to see a recreation of new WAAFS arriving at Bawdsey to operate the radar receivers.

Finally some wartime songs and the bus ride back to Orwell Hotel.

Absolutely brilliant. There's still time to go see it – check out the web site
www.visitfelixstowe.co.uk/what-s-on/black-and-white-productions-felixstory-a-dramatic-promenade/

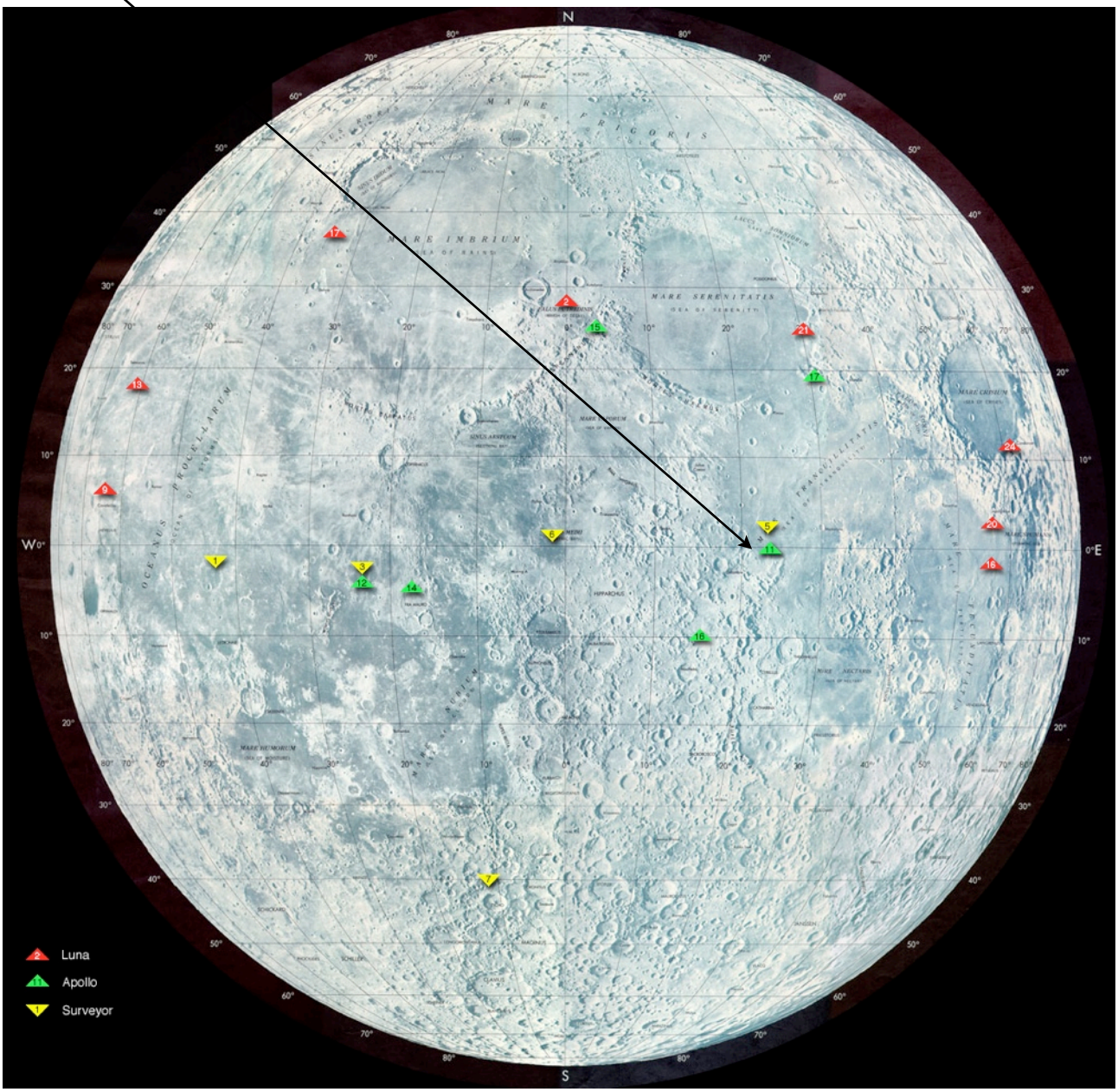
Paul

45 years ago

Martin RH

Some of us are old enough to remember the first manned landing on the Moon on 20 July 1969. My son was born 4 days later and some poor baby in the same maternity hospital was named Apollo.

Here is a map of the Apollo landing sites. The Apollo 11 landing site at the Sea of Tranquility is here.



Source: http://www.jpl.nasa.gov/history/hires/1968/moon_landing_map.jpg

And while we're reminiscing (well, some of us) about the events of July 1969, let's wish a slightly belated Happy Birthday to Vera Rubin....

Vera Rubin

Sources: www.brainpickings.org/index.php/2013/07/23/vera-rubin-berkeley-commencement-address/

www.nsf.gov/news/special_reports/medalofscience50/rubin.jsp

Vera Rubin was born on July 23, 1928 and graduated from Vassar in 1948. She was the only astronomy major in her class. Rejected by Princeton's graduate school, which didn't allow women into the programme, she eventually received a master's degree from Cornell in 1950 and a Ph.D. from Georgetown in 1954. She went on to confirm the existence of dark matter by proving beyond doubt that galaxies spin faster than Newton's Universal Law of Gravitation dictates they should.

On May 17, 1996 — exactly 48 years after her own graduation in 1948 — Rubin addressed the graduating class at Berkeley. The transcript of her timeless and timely commencement speech was included in her excellent 1997 anthology of essays, ***Bright Galaxies, Dark Matters*** .

In this address she traces the journey of a single carbon atom from 15 billion years ago to the miracle of the human body, by way of a glass of milk, then brings it all back to the awareness that we are all stardust:

> "You drank the milk, the carbon atom entered your bloodstream, traveled to your brain, displaced a carbon atom, and took part in the thought process permitting you to pass your final exam. So without that single carbon atom, made in some star billions of years ago, you might have failed to receive your diploma today. See how lucky you have been?"

Astronomer Vera Rubin in 1974,
with her "measuring engine" used to examine photographic plates.

Credit: Courtesy of Carnegie Institution of Washington

Newbourne Video Library

Do you have any astro/cosmos/space DVDs you would be willing to donate/lend for those cloudy nights at Newbourne?

Contact Mike Norris, David Murton, Kevin Fulcher.

Evaluating the distance between Mars and Earth

using observational data.

Mike O' Mahony [omahony.mike@gmail.com]

Introduction

Mars was in opposition on April 8th when it was approximately 96 m km (0.62 A.U.) from Earth. As an exercise I set out to try and measure its distance as it moved away from opposition in the following months. The approach taken was to use a telescope and camera to first measure the planet's image size on the camera sensor and use this result to calculate the planet's angular diameter. Together with the known physical diameter and the help of some trigonometry, the distance can then be calculated. The results were compared with those given by the simulator SkySafari and found to be within 10%. A good estimate of radial velocity could also be obtained. On 17th July measurements showed Mars to be approximately 165 million km away travelling with a radial velocity of 40,400 km/hr.

Approach

Fig 1 shows the set-up with a 300 mm f5 DOB connected to a Canon EOS 600D DSLR via a x5 Powermate (Barlow).

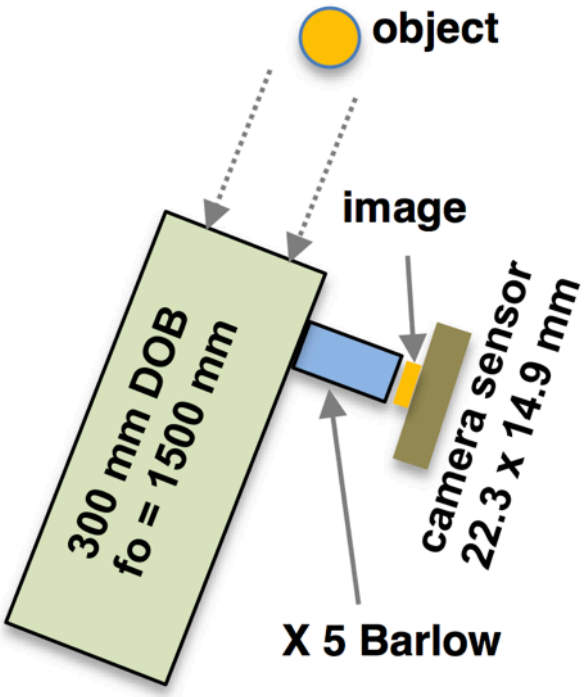


Fig 1a Measurment setup

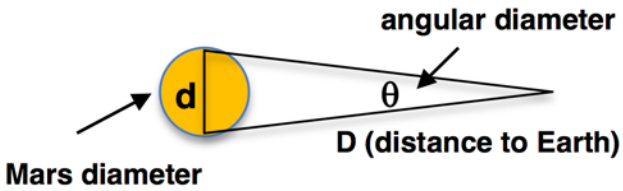


Fig 1b A little trigonometry

The camera sensor (an APS-C) measures 22.3 x 14.9 mm, so the size of the Mars image on the sensor can be readily determined; viewing on a computer screen allows a very accurate measurement to be made. The relationship between an object's angular size and its linear image size is given by (Ref):

$$\textbf{angular object size (")} = \frac{\textbf{image size (mm) x 206265 (")}}{\textbf{fo (mm)}} \qquad 1$$

where mm denotes millimetres and (") arc-seconds, fo is the total focal length and the factor 206265 arises from dimension conversions between radians, degrees, minutes and seconds.

Once the angular diameter has been obtained from eqn 1, then trigonometry (Fig 1b) can be used to find the distance D between Mars and the Earth. As the angular diameter is very small and the distance large, assumptions can be made such that:

$$\sin(\theta) \cong \theta = \frac{d}{D}\,; \qquad \therefore D = d/\theta \qquad 2$$

where d is the physical diameter of Mars (6792 km) and θ is its angular diameter in radians.

Combining these two equations (with a radian to degree conversion) gives a rather simple means of calculating distance, namely:

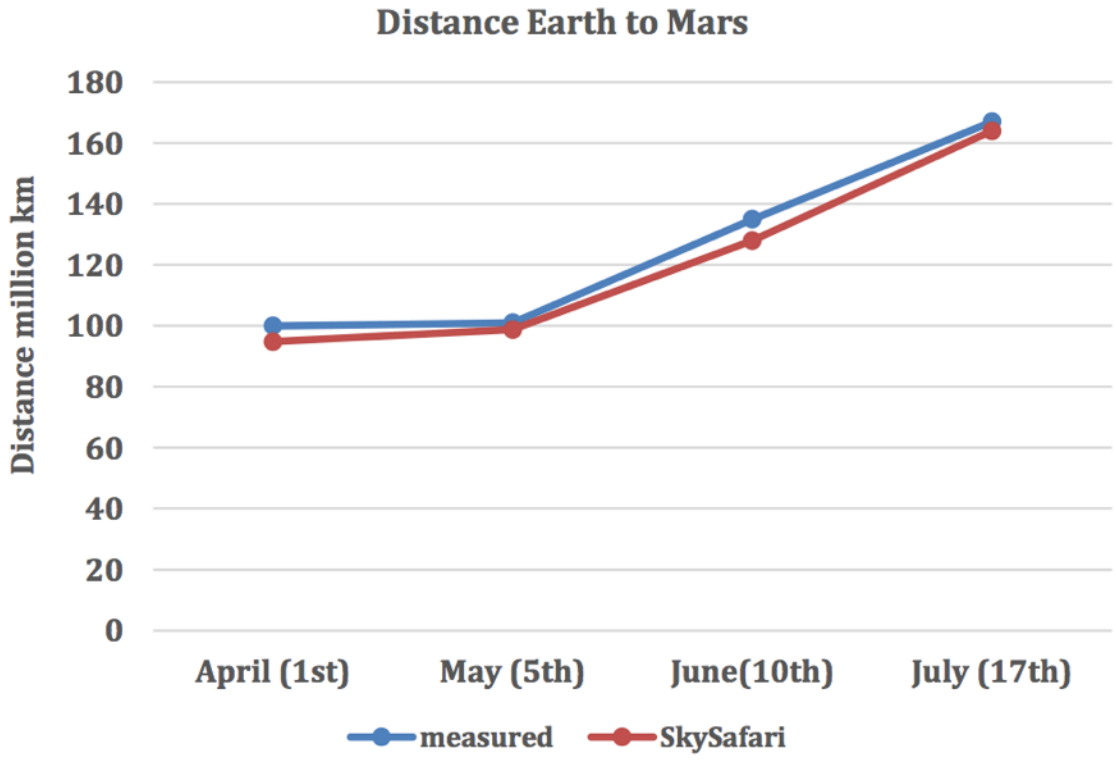
$$\mathbf{D\ (km) = d\ (km).\ \frac{fo\ (mm)}{image\ size\ (mm)}} \qquad 3$$

Thus the distance to any planet is obtained by multiplying the planet's diameter by the ratio of the telescope focal length to the image size.

Results

Distance

The data for Mars is rather sparse with four observations over a period of four months, but enough to check the accuracy of the method. Eqn.3 was used to convert measurements of Mars image size to relative distance and these are plotted in Fig 2. Also shown are data taken from SkySafari simulator by way of comparison. The measured results show an error of 2-10% over the range, a surprisingly good result.



It was expected that the measured results might give a low estimate of distance as the planet's disc size will be overestimated because of poor seeing, indicating the planet is closer than is the case. The four measurements corresponded to a Mars angular diameter changing from 14

to 8.4 arc-seconds and as the diameter gets even smaller it is expected that the error will grow.

So the results show that at, and close to, opposition Mars was approximately 90 million km from Earth. Within two months (May-July) the distance had increased by approximately 70 million km to 164 million km.

Radial Velocity

It is well known that the relative motion between Mars and Earth can exhibit unusual behaviour because of their proximity and different orbit speeds. Therefore making estimates of relative velocity on the basis of four measurement points is not too sensible. Having said this if the velocity [distance/time] is calculated over the linear segment between May and July, a value of 36400 km/hr is obtained; this corresponds reasonably well to the radial velocity of 40,400 km/hr given by SkySafari on 20th July.

Conclusions

A technique for evaluating the distance between Earth and any planet or moon was discussed, based on the measurement of the planet image size registered on a camera sensor. The main limitation is the ability to accurately image very small disc sizes such as those associated with Neptune and Uranus, however advanced photographic techniques such as high speed video may help in this respect.

Ref:

"The Deep Sky Imaging Primer", Charles Bracken, ISBN-13:978-148180

Britain and the Gregorian calendar

By Joe Startin

The problem

The time between a spring equinox and its next occurrence – a 'tropical year' - is approximately 365 and a quarter average-length days. If your calendar has a year which is always 365 days long, the seasons will advance quite rapidly through it. They were well aware of this in ancient times, and handled the matter in various ways. In due course, Julius Caesar introduced a rationalised 'Julian' calendar, where a year has 365 days except for a leap day at the end of February every 4 years.

Use of the Julian calendar stabilised in AD 4, and allowed the familiar rule 'leap year when exactly divisible by four'. But the allowance for the extra quarter day is still only an approximation, and as time passed this took its toll. A mean tropical year is currently 365.2422 days, and by AD 1582 the seasons had advanced 10 days through the calendar. This prompted a reform by Pope Gregory XIII. He wanted to move the time of the spring equinox close to its conventional date of 21st March, as used in the computation of the date for Easter ever since the First Council of Nicaea in AD 325, and then to arrest its drift.

The Gregorian reform absorbed the 10 days, and decreed that century years which were not exactly divisible by 400 (e.g. 1700, 1800, 1900, but not 1600 or 2000) would not be leap years. This leads to 97 leap days every 400 years, and an average length of year of 365 + (97/400) = 365.2425 days, which will serve well enough long into the future.

The Gregorian calendar was introduced into different countries at different times. Where the Catholic Church held sway, the change was made on the day after Thursday 4th October 1582, which was decreed to be Friday 15th October 1582. In practice many places did not reform until 1583. Elsewhere, Denmark (with Norway) changed in 1700, Sweden changed gradually over the period 1700 to 1740, Britain and its colonies changed in 1752, Russia in 1917, Greece in 1923, and so on.

Britain catches up

Here, the Parliament of Great Britain passed the 'Calendar (New Style) 1750 Act', and after midnight on Wednesday 2nd September 1752, the British Empire jumped to Thursday 14th September 1752. 11 days now had to be absorbed, because 1700 had been a leap year, contrary to the Gregorian calendar.

An Annexe to the Act set out the new rules required in the Book of Common Prayer for the computation of Easter. These were carefully differentiated from Pope Gregory's rules, even though they gave the same answer.

There never was a 'calendar riot' where the mob demanded "Give us our eleven days". This story comes from William Hogarth's satirical 1755 painting, 'An Election Entertainment', at the Sir John Soane Museum, Lincoln's Inn Fields. The picture shows this slogan on a discarded placard. In the 1754 elections, the Tories opposed the Whigs on every issue, including "Popish calendars".

The Act made an additional reform. In 1752 the beginning of the legal year was pinned down to 1st January. From the 12th Century onwards it had been Lady Day, 25th March. So 1751 was only 282 days long. 1752 now included its leap day before the jump, and lasted only 355 days. There is some debate about the impact on the financial year. The usual theory is that it began on 25th March 1752, and was allowed to run its usual 365 day course. So in 1753 it started on 5th April. It followed the Julian calendar, allowing for a leap day in 1800, where the Gregorian calendar had none. So the start of the financial year moved to 6th April. In 1900 the start was fixed at 6th April.

For times prior to 1752, ambiguity can arise about which year the dates from 1st January to 24th March should fall into. In most European countries, the year start was set at 1st January well before the Gregorian reform of 1582, and Scotland had followed suit in 1600. In recognition, many English documents would specify the year as 'Old Style or 'New Style' where they thought necessary. So, Charles I was executed on 30th January 1648 (O.S.)/1649(N.S.) Scandalised French aristocrats would have dated the execution as 9th February 1649.

Later on, O.S. was also used to denote a Julian rather than a Gregorian date. So, someone might say that Newton was born 25th December 1642 (O.S.) It is often claimed that Galileo died in the same year. Galileo did die on 8th January 1642, but that is by the Gregorian calendar, and his death translates to 29th December 1641 (O.S.) Newton's birth was 4th January 1643 (Gregorian), so in fact the years do not match in either calendar.

Empires

All of Britain, with her colonies, made the Gregorian reform at the same time. Consequently, early recorded history for much of North America uses 'Old Style'. This may explain why the 'cal' function in the Unix operating system, which will print the calendar for a specified month, makes its Gregorian jump in 1752.

In the nineteenth century, British interests extended westwards as far as the Northwest Territories of the Hudson's Bay Company. Where they stopped, Russian America lay on the other side of an equivalent of the International Date Line. After the Crimean War, the Russians were nervous that their colony would be vulnerable in any subsequent conflict they had with Britain. They approached both Britain and the US with a view to sale, perhaps hoping for a bidding contest. This did not materialise, but after the distractions of the American Civil War the Russians re-entered negotiations with the US, and struck a deal with the Secretary of State, William Seward, at 4 a.m. on 30th March 1867. The US paid $7.2 million for what they now called Alaska. The Russians used the Julian calendar, and had counted 1800 as a leap year, so by then they were 12 days behind the Gregorian calendar. Understandably, the US wanted to shift the date line westwards, to the Bering Strait. The day before transfer was Friday 6th October 1867 (Julian). Transfer itself took place in the city of Sitka, with due ceremony from the Russian and American military. That was on Friday 18th October 1867 (Gregorian), with a loss of only 11 days. Catholics must have eaten fish two days running.

Detail of a painting by William Hogarth, ca. 1755; original title: "An Election Entertainment", from the series known as "The Humours of an Election" or (when engraved) "Four Prints of an Election".

Includes famous "Give us our Eleven Days" protest slogan against the Gregorian calendar at lower right (on black banner on floor under foot [of OASINews Editor?]).

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Debenham and New Members' Day at Nacton

Solar observing (briefly!) at Debenham Street Fair

New Members day at Nacton Village Hall (Photos by Tina Hammond)