Asteroids and Remote Planets Section

(156) Xanthippe occultation

The asteroid (156) Xanthippe occulted the star UCAC4-409-131091 on 2018 Oct 29 – a well observed event from the south of England.

Predictions for this asteroidal occultation appeared on Steve Preston's International Occultation Timing Association (IOTA) website earlier in the year. (**www.asteroidoccultations.com**). The updated path crossed southern England and parts of Wales, Ireland and East Anglia, extending into Belgium, Holland and locations further east (Figure 1). England was enjoying fair weather, which allowed 18 observers to attempt timings of the disappearance of the magnitude +11.9 star and to record its duration.

Video observers used GPS time inserters (GPSBOXSPRITE3 or IOTA-VTI), and USB-CCD users used carefully time-synchronised computers connected to NTP or GPS. Figure 2 shows the occultation lightcurve at the fast time resolution of 25fps (0.04s per frame).

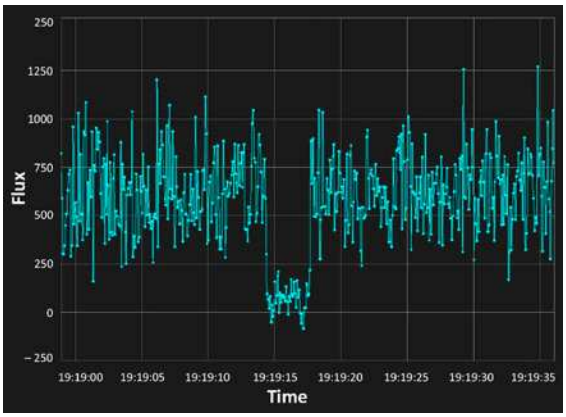

Figure 2. 20cm aperture telescope and video at 25fps, D-R 3.28s. *L Broom.*

Fourteen positive observations were received, defined to be those for which observers recorded a disappearance (D) and reappearance (R) of the star. The result is a preliminary outline for the asteroid computed by Eric Frappa, accessible at **www.euraster.net/results/2018/20181029-Xanthippe_crd.gif.**

On the sky plane (Figure 3) the disappearance is shown as a red spot and reappearance is given in green. The line for each observer is interrupted at times D and R, when the star was occulted.

A smooth ellipse drawn through the averaged observations give the asteroid's dimensions as 107 ± 4km by 95 ± 3km. This can be compared to the infrared diameter of 125km for Xanthippe. It is quite likely that the profile presented was different to that recorded in previous measurements (the *Occult4* database (D. Herald) lists 30 chords from 10 previous occultations by Xanthippe) since most asteroids rotate. The observations show some scatter in chord lengths. This is caused in part by small differences in measurement technique, *i.e.* timing accuracy and exposure. Overall, observations deviate in places from the ellipsoidal outline.

A dotted line representing the prediction (see external link above) has a small offset from the observed centre of about 0.1 diameters. This indicates an excellent prediction of the shadow path. There is a concentration of observer chords across the centre of Figure 3, so it was fortunate that the remainder were fairly evenly north (chords 1, 2, 3 & 14) and south (chords 9, 10, 13 & 15).

There is no 3D shape in the Database of Asteroidal Models from Inversion Techniques (DAMIT) so it is not yet possible to compare this profile with previous observations.

Observed diameters from recent observations

Date	*Diameter (km, rounded)*
2018 Oct 29	107×95
2018 Aug 05	124×97
2017 Mar 15	114×95
2016 Nov 15	110×110
2011 Dec 26	126×103

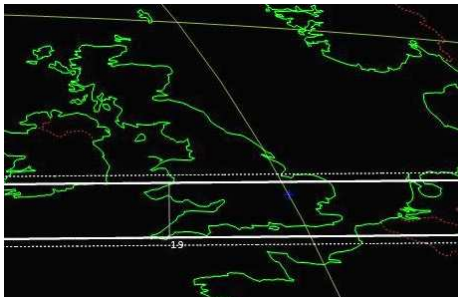

Figure 1. Path of Xanthippe from left to right on the Earth plane. Predicted mid-time was 19h 19.2min. *Occult4.*

Occultation subgroup

The Section has an active subgroup of observers monitoring asteroidal occultations on a regular basis. A BAA alert is sent for favourable events where we believe there is good chance of success, and for which we might obtain many chords as in this instance.

In 2018 there were more successful multi-chord events recorded than in previous years. This is due to improvements in the predictions (from *Gaia* star positions) and an increasing number of observers monitoring more events using *Occult-Watcher* planning software.

For more information, potential observers might find this tutorial useful: **https://britastro.org/node/16423.**

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Table of observations received by the Section

Observer	*Duration (s)*
Luke Broom-Lynne (Thetford)	3.28
Simon Kidd (Stevenage)	5.02
Sean Clarke (Cuddington)	5.60
Chris Hooker (Didcot)	5.66
Adrian Jones (Maidenhead)	5.76
Daniel Bamberger *et al.* (Northolt)	5.70
Peter Birtwhistle (Gt Shefford)	5.60
Tim Haymes (Knowl Hill)	5.70
Phil Denyer (E London)	5.68
Peter Tickner (Reading)	5.62
Geoff Thurston (Hartley Wintney)	5.66
Richard Miles (Stourton Caundle)	4.62
David Briggs (Hants Astro)	4.20
Malcolm Jennings (S London)	5.40
Mark Ashforth (Fareham)	4.0
John Savage (Sturminster Newton)	4.4
Steve Knight (Banbury)	5
Grant Privett (Porton)	4
Derek Robson (Loughborough)	No detection

Note: Reports contained the position of the observer, equipment details and the time (UT) of both D & R events, indicating exposure and timing accuracy.

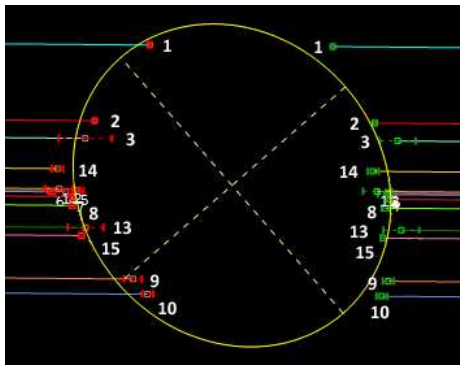

Figure 3. Analysis of timings made from different locations, displayed using *Occult4* software.

'Ultima Thule' revealed

On 2019 Jan 1 – as the *Journal* was being prepared for press – the spacecraft *New Horizons* made an historic flypast of 2014 MU_{69} 'Ultima Thule', returning this remarkable image.

Image credit: NASA

The existence of the icy world's distant home, the Kuiper Belt (also known as the Edgeworth–Kuiper Belt), was proposed by pioneering BAA member Kenneth Edgeworth in the pages of the 1943 July *Journal*.

Philip Jennings, *Editor*