

Some GB/IE-region observations 2022-2023



Y98

Tim Haymes
BAA, IOTA-ES
(SODIS reviewer for GB)

ESOP LXII @ Armagh Observatory
2023 Sep 17-18



C11 F6 + QHY + filter wheel

Introduction

The BAA *Asteroids and Remote Planets Section* has about 15 regular observers spread across the GB-“region”

I use the term “region” to describe an area that include EIRA, UK, and a part of the NL/BE where there are some members of the British Astronomical Association.

As a SODIS reviewer, I review observations for GB and IE, helped by Alex Pratt and Simon Kidd who share the reviewing tasks.

I present some interesting observations.

Some of our enthusiasts...in no particular order



Richard Miles
Director-ARPS



Tim Haymes
Oxford



Peter Tickner
Reading



Simon Kidd
Stevenage



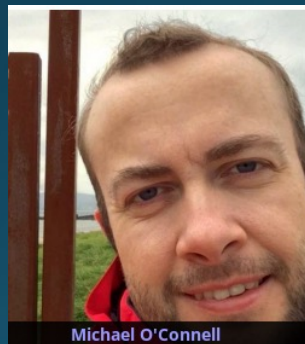
Alex Pratt
Leeds



Derrick Ward
Swindon



John Talbot
- UKOCL -



Michael O'Connell
Dublin IE



Phil Denyer
London



Derek Robson
Loughborough



William Stewart
Chester



Dave Briggs
Clanfield

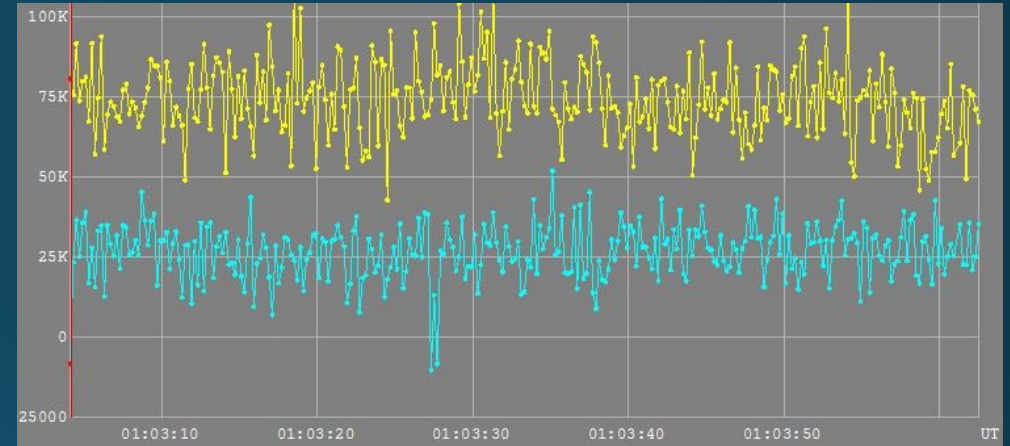
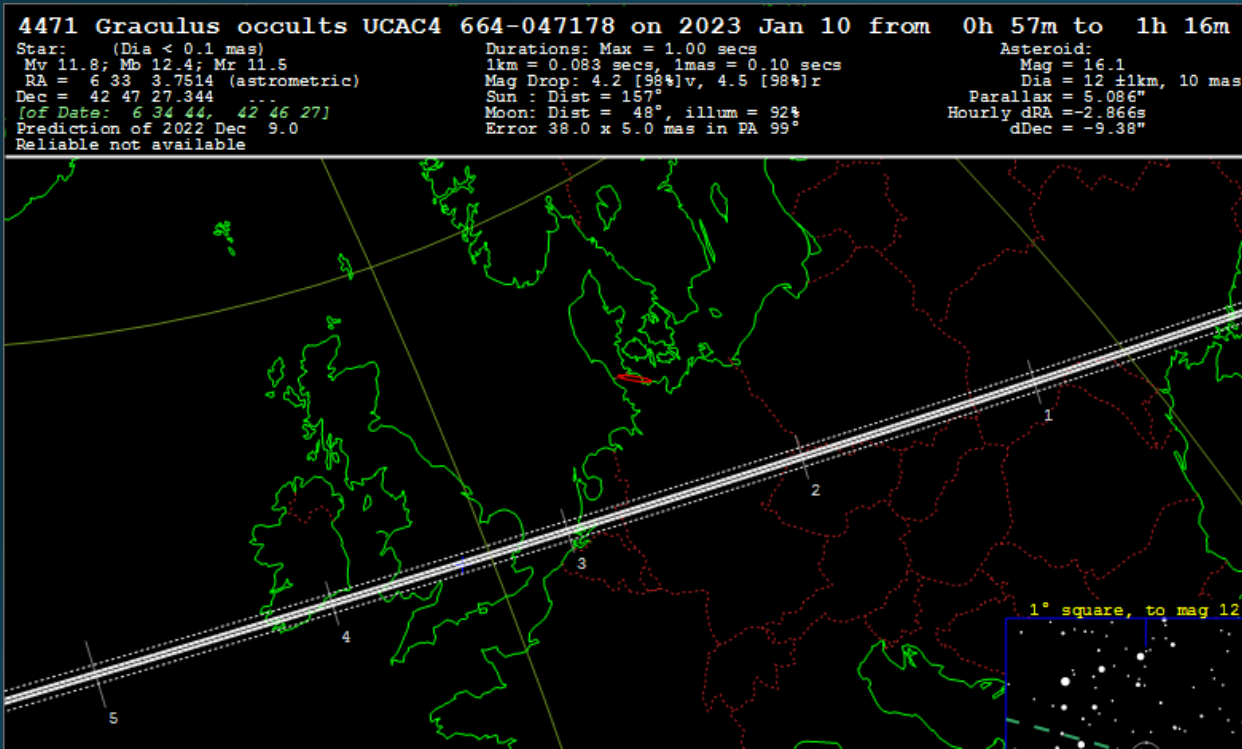
Distribution of observers in our region



Credit: Google Earth

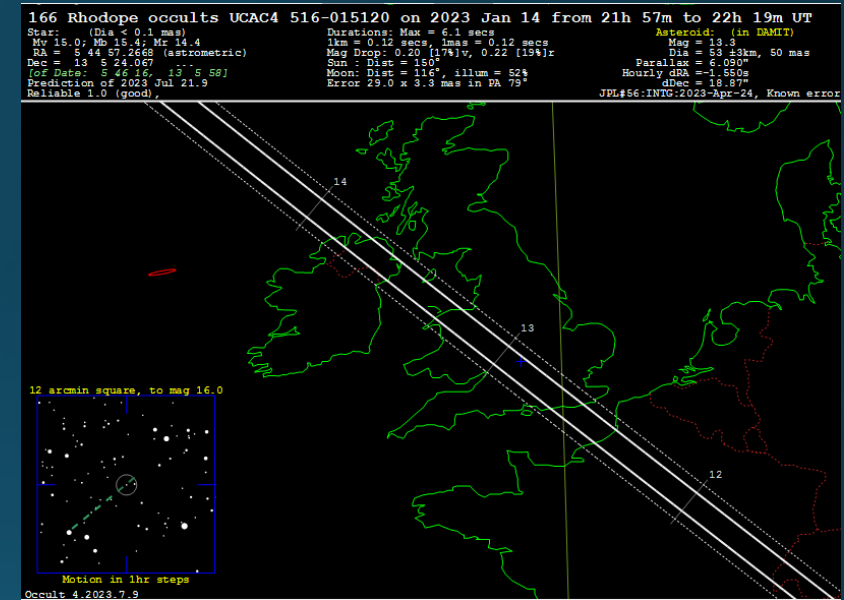
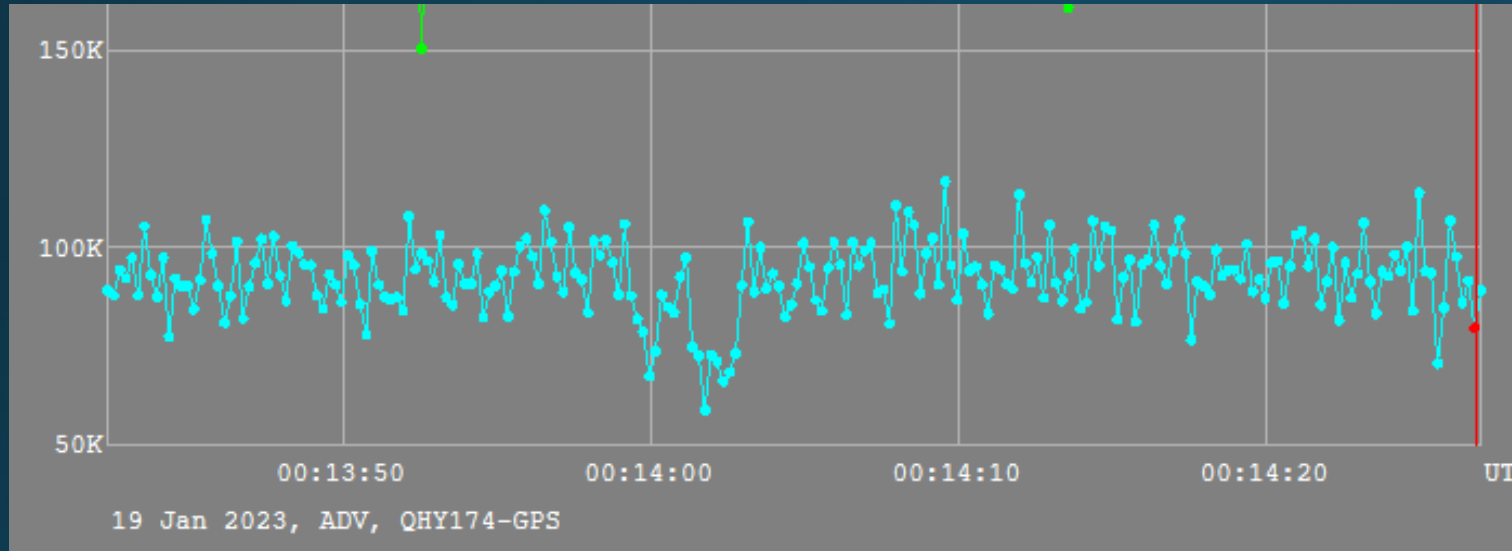
(4471) Graculus on Jan 10th star mag 11.5

T Haymes, S. Kidd. Durations 0.6 +/- 0.22, 0.75 +/- 0.02 1st Observation of (4471)



Unusual to have two well separated chords across a 12Km asteroid – just lucky. The observers are 85 km apart

(325) Heidelbergga probable graze on 2023 Jan 19 (Alex Pratt). Duration 1.6, 0.9s



Alex has his own presentation on this light curve.

Note the rise in light curve. We see this from time-to-time on different events. These are thought to be caused by noise. Only this example is supported by a second light curve.

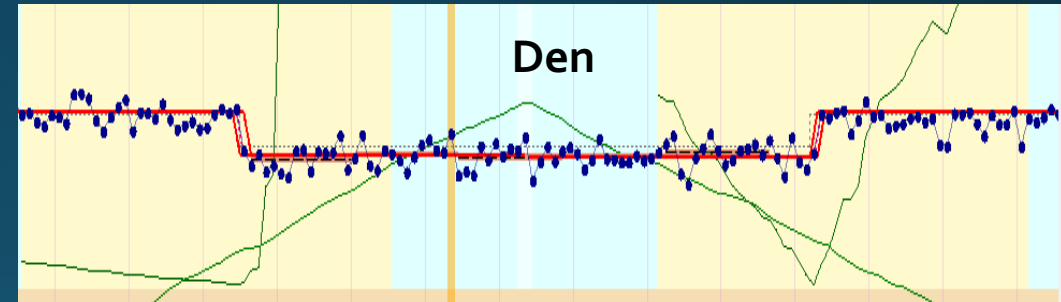
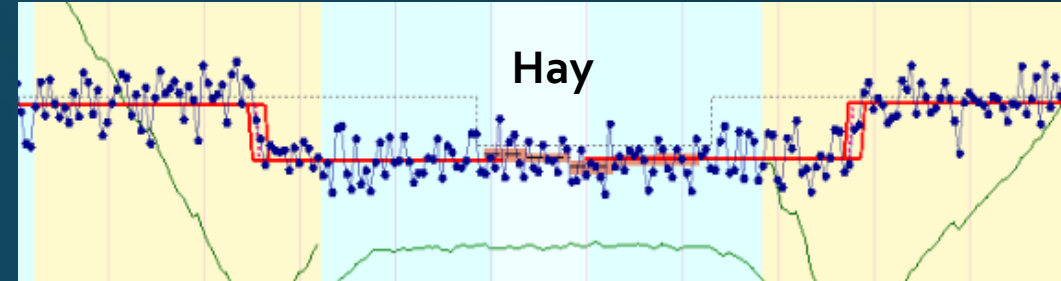
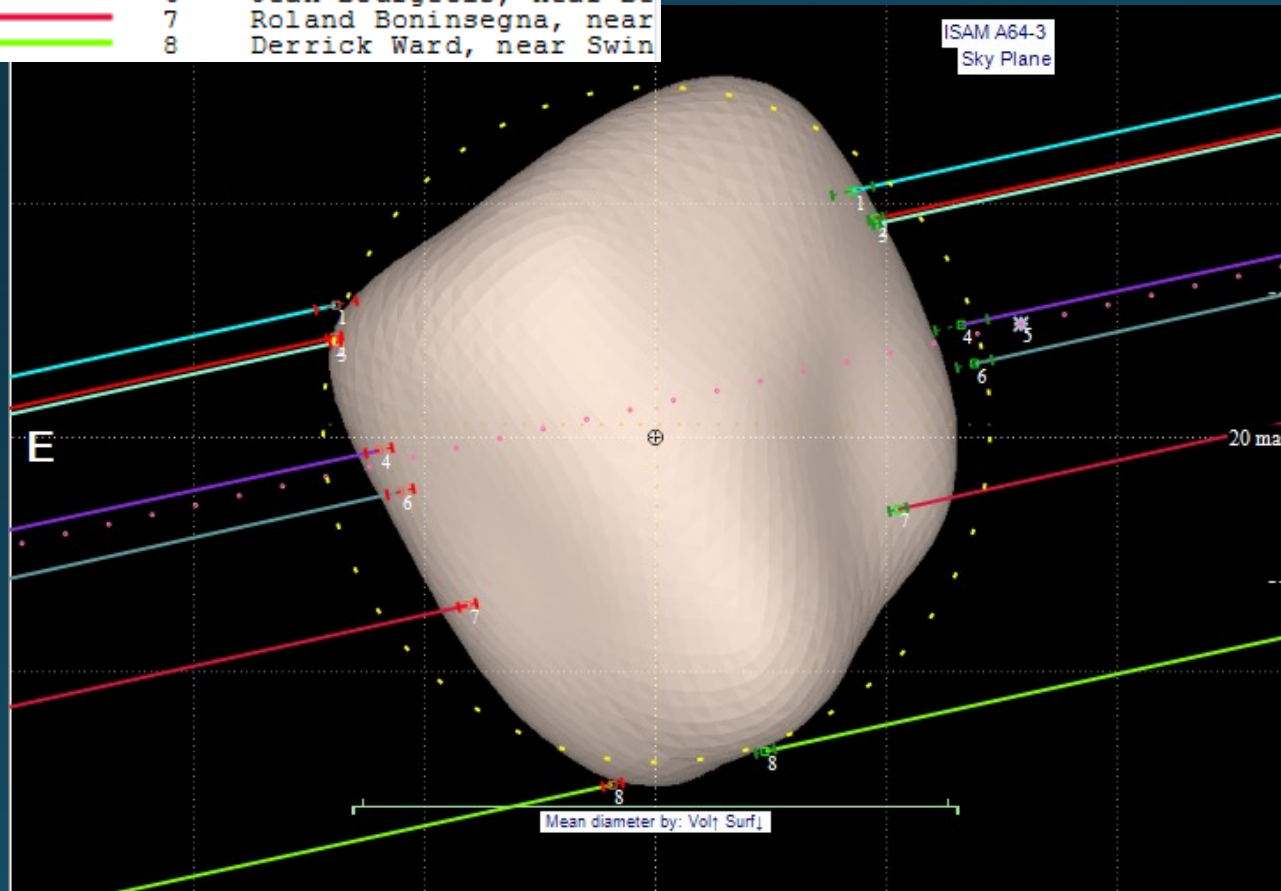
(64) Angelina on Feb 26

(Haymes, Denyer, Ward, O'Connell and more..)

2. Haymes	C11, QHY	12.46	+/- 0.17	exp 0.1	QHY
3. Denyer	C9.25 WAT	12.44	+/- 0.12	exp 0.16	WAT
8. Ward	N 8" ASI174	3.51	+/- 0.22	exp 0.1	

- 1 Karim Saci, near Dunker
- 2 Tim Haymes, near Oxford
- 3 Philip Denyer, near Lon
- 4 Michael Oconnell, near
- 5 (P) Predicted
- 6 Jean Bourgeois, near Be
- 7 Roland Boninsegna, near
- 8 Derrick Ward, near Swin

Good agreement on chords 2+3 by different equipment.



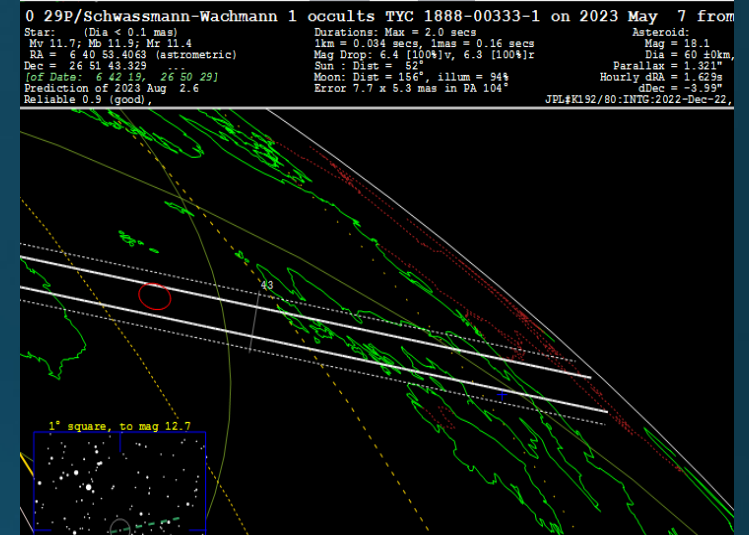
Well constrained
Graze ?

Profile Credit: Christian Weber and Dave Herald

29P Schwassmann-Wachmann occulted TYC 1888-333-1 on May 07 m 11.4 star by Malcolm Jennings in S London *Lucky Star Prediction.*

Potential observers across the UK were contacted through the Ukocultations.groups.io, *The Astronomer Magazine* and BAA forum.

The response was good: 9 observers reporting, **3 x Miss**. **One +ve** and five no-observation. The +ve observation by *Malcolm Jennings* was unclear at first, but analysis with Tangra and AOTA revealed a 4 frame event at 0.08s cadence => 0.38 sec duration. [10" Newt, WAT-g10HX + iotaVTI]



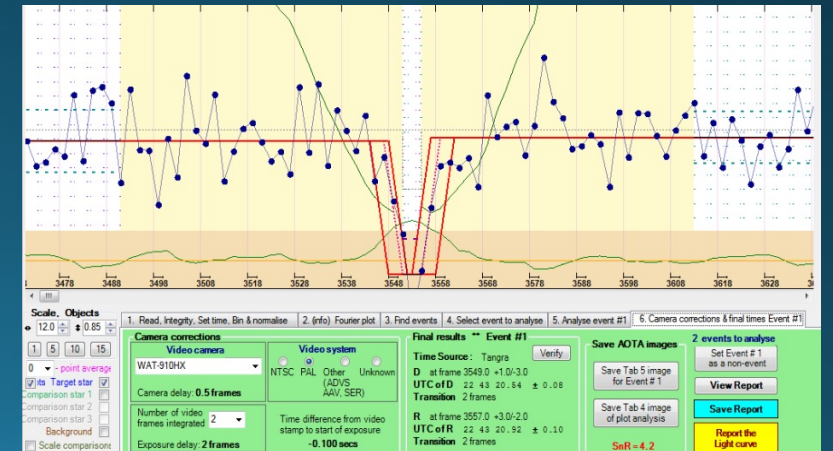
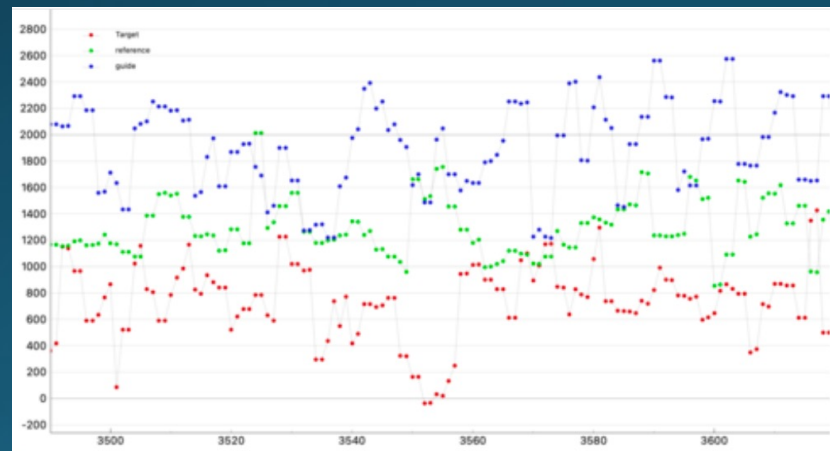
PyOTE M Jennings

Tangra / AOTA confirmed by C Weber (iota-es)

Conclusion:

The single short chord represented a path shift. A good observation and the

***FIRST* confirmed comet nucleus detection from the UK.**



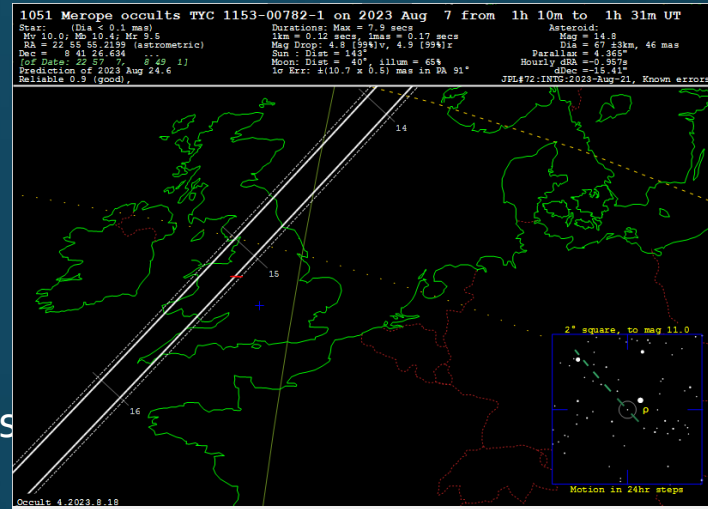
(1051) Merope on Aug 07

Double Star or a Graze? (William Stewart)

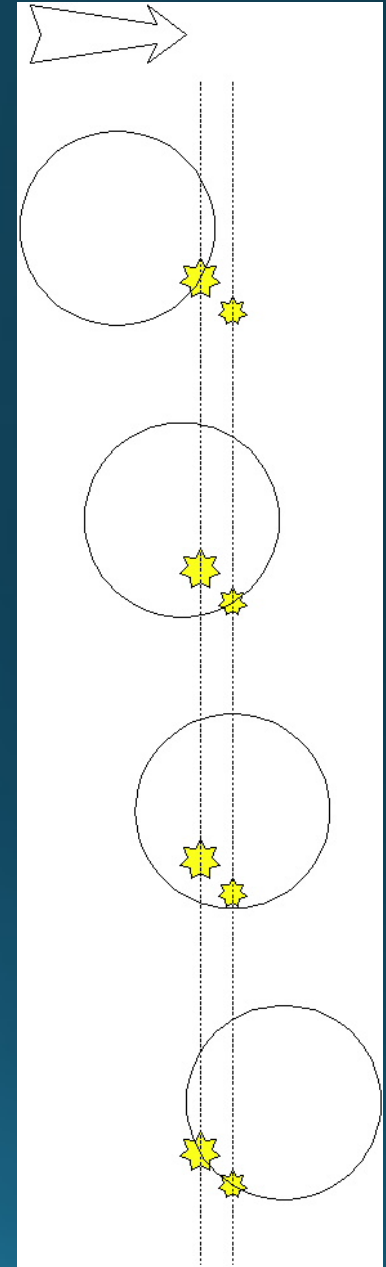
C11, WAT-g10HX and OccuRec as AAV.

Background:

Bright TYC star Mr 9.5 recorded at high cadence 25 fps
 Large asteroid with diam. 67 Km
 Maximum duration was 7.9 sec
 Recorded at the path edge D/R 0.56 sec



Diag. credit W Stewart

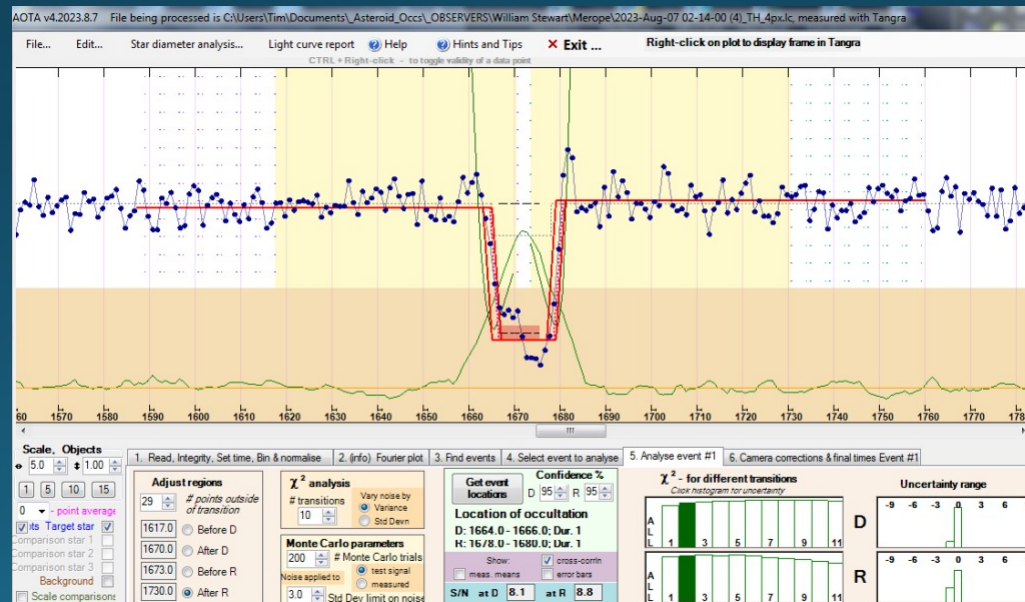


Note:

Non- zero flux at extinction.

Step on D.

No step + flash on R

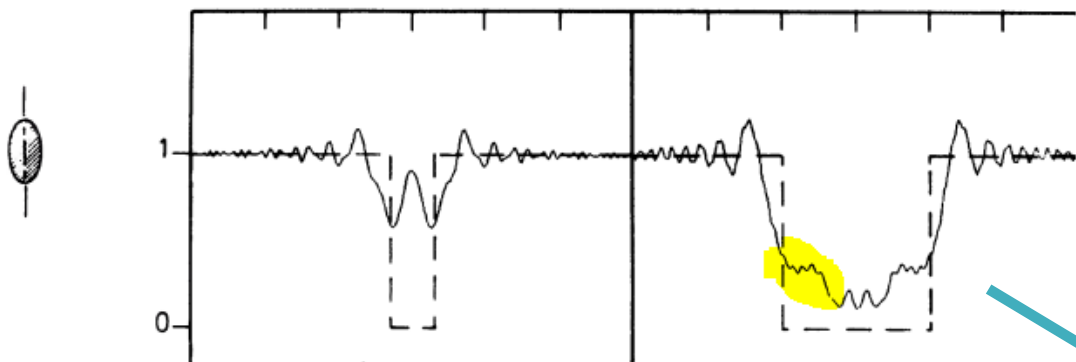


(1051) Merope on Aug 07

Diffraction explanation from D Herald / D Gault.

The "Help" file shows..

1555 ROQUES *ET AL.*: OCCULTATIONS BY SMALL BODIES



Star diameter, Fresnel diffraction : Occult v.4.2023.8.15

with Details... Help Exit

1051 Merope occults 1153-00782-1, on 2023 Aug 7

Star Diameter
 diameter = .06mas [Estimated]
 = 82 meters on the Fundamental Plane
 => fades of about 0.01 secs might be expected.

Fresnel diffraction
 distance from object edge to peak Fresnel brightness ~ 345m

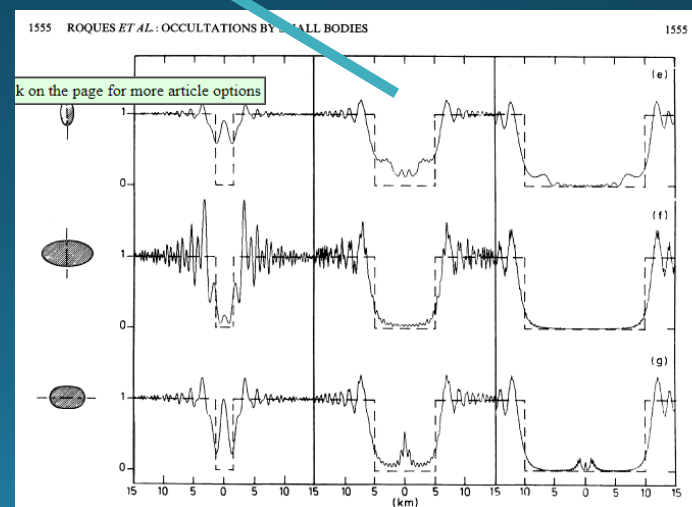
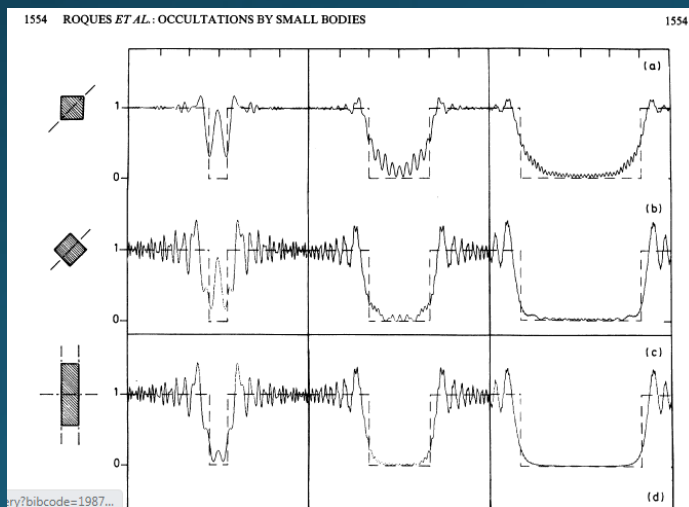
diffraction for light drop of 2 mag (to 16%) = 0.2 mas
 => fades of 0.03 secs might be expected

diffraction for light drop of 4 mag (to 2.5%) = 0.5 mas
 => fades of 0.08 secs might be expected

diffraction for light drop of 6 mag (to 0.4%) = 1.2 mas
 => fades of 0.21 secs might be expected

All times should be divided by sin(impact angle)

<https://adsabs.harvard.edu/full/1987AJ.....93.1549R>



(1051) Merope on Aug 07

And a final thought from Dave Herald. Not a double star.

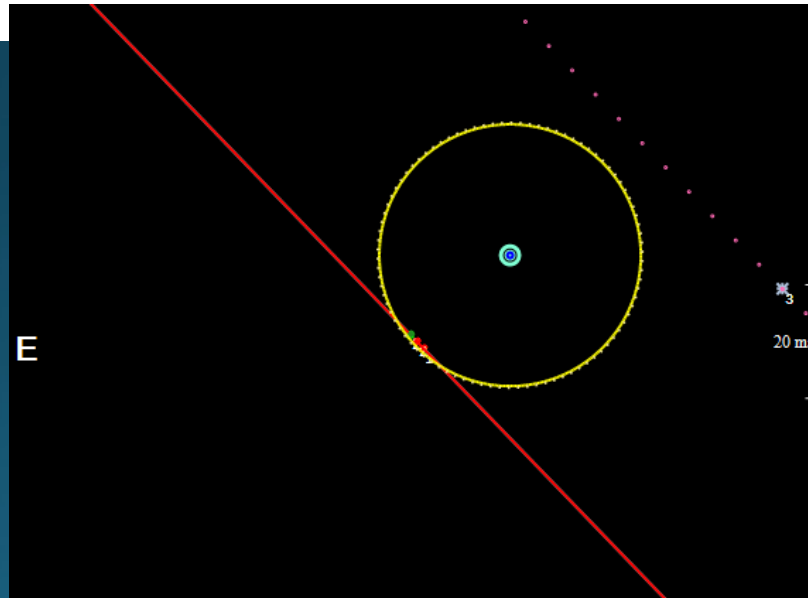
If the event duration is T_e , and the expected max duration is T_m the % distance from the center of the asteroid to the chord is:

$$\sqrt{T_m^2 - T_e^2} / T_m$$

Put in 7.9 and 0.56, and you get $\sqrt{7.9 \cdot 7.9 - 0.56 \cdot 0.56} / 7.9 = 7.88 / 7.9 = 99.7\%$ of the radius.

At this distance the light curve will be dominated by Fresnel diffraction and limb topography. Double star explanations are far less likely – indeed, can be ruled out.

Dave Herald
Murrumbateman
Australia



DUAL OBSERVATION: (5022) Roccapalumba 2022-01-12

Two observations: mobile + home (T. Haymes)

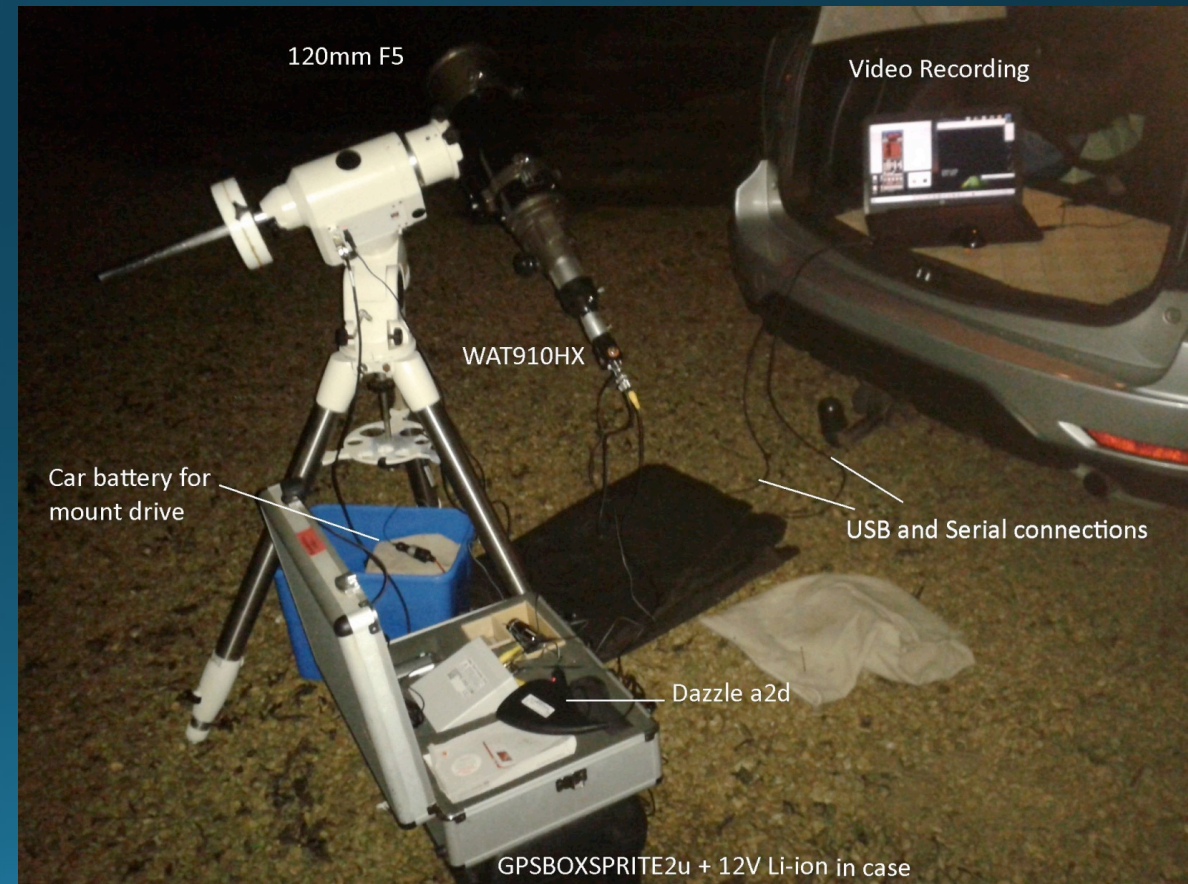
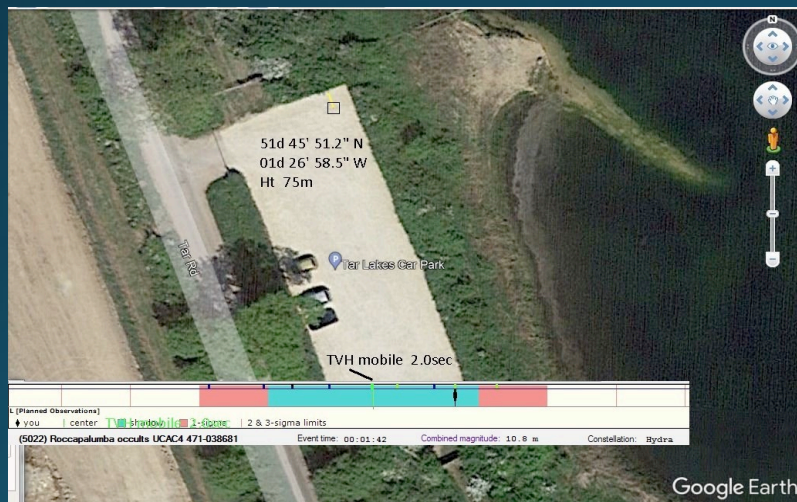
Ideal circumstances allowed an observation from home and a **mobile station**. Weather forecast was for “no clouds”

The mobile station was at a nature centre car-park. Only a 30 min drive.

Star was magnitude 10.5. Made finding easier.

(But its never easy when the clock is counting down...!)

The telescope is a 120mm F5 Helios refractor with WAT910HX + GPSBOXSPRITE+ IOTA VideoCapture 2.2



(5022) Roccapalumba 2022-01-12

The home "unattended" observatory (Eric termed this as "remote")



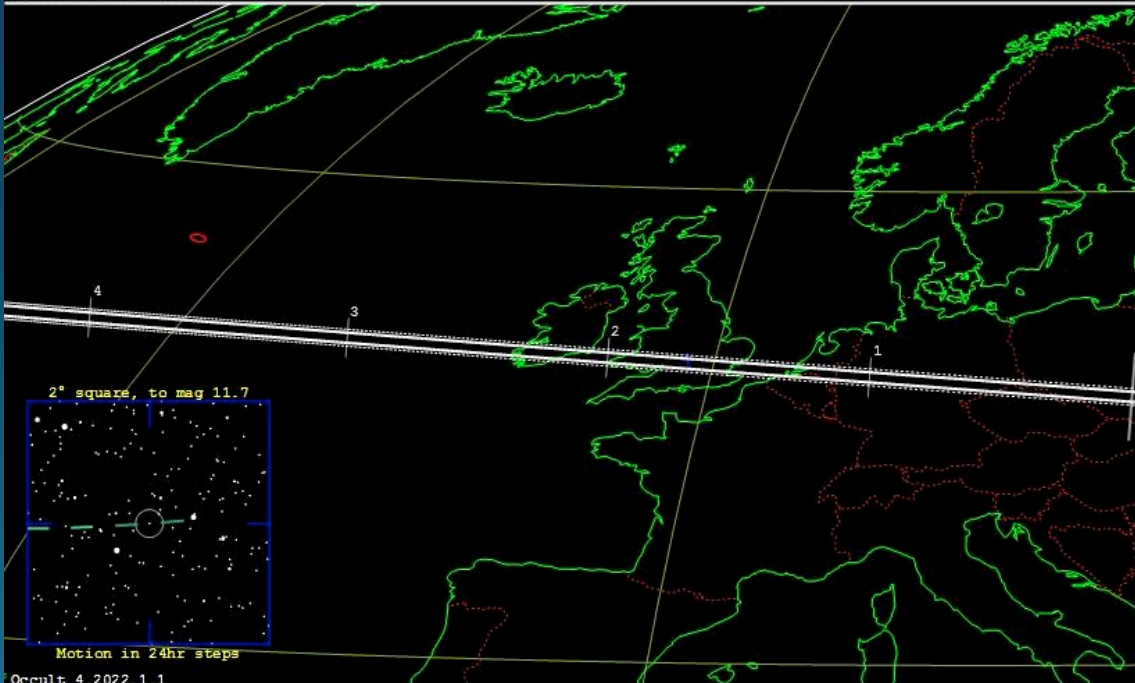
The home observatory was C11 + QHY174GPS controlled by SharpCap scheduler with a time delay of about 1 hr.

The observatory dome was set to rotate at sidereal rate.

Diameter 33km. Max durn. 2.3 sec



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5022 Roccapalumba occults UCAC4 471-038681 on 2022 Jan 11 from 23h 55m to 24h 5m
Star: (Dia < 0.1 mas)           Max Duration = 2.3 secs           Asteroid:
Mv 10.7; Md 11.0; Mr 10.5       Mag Drop: 6.2 [100%]v, 6.2 [100%]r  Mag = 16.9
RA = 8 18 45.5840 (astrometric)  Sun : Dist = 159°                 Dia = 33.41km, 18 mas
Dec = 4 10 3.863                Moon: Dist = 79°                 Parallax = 3.653"
[of Date: 8 19 56, 4 5 55]      : illum = 71 %                   Hourly dRA = -1.880s
Prediction of 2021 Nov 15.0     Error 14.0x6.0 mas in PA 101°     dDec = 2.11"
Reliable not available
```



Occult4
D Herald

(5022) Roccapalumba 2022-01-12

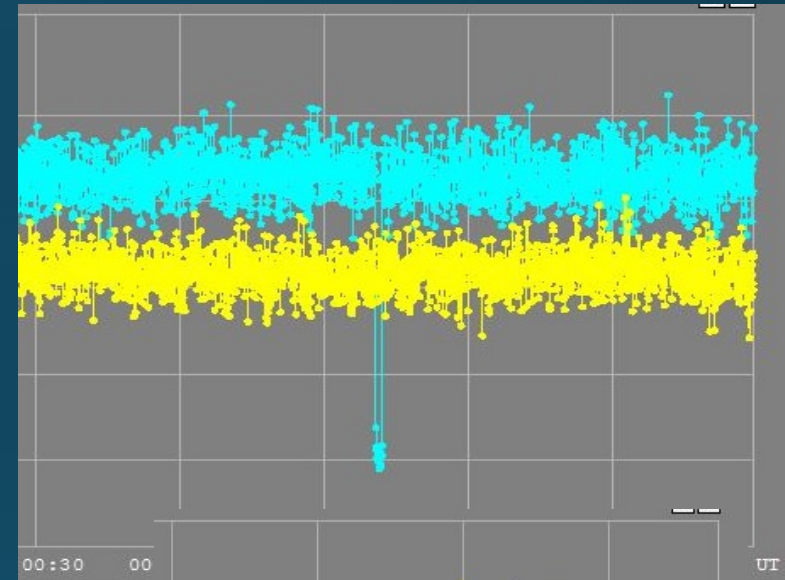
The Tangra light curves are compared.

[QHY174M]
Output Format=SER file
Binning=2x2
Capture Area=1920x1200
Colour Space=MONO16
USB Traffic=1
Offset=50
Amp Noise Reduction=On
Frame Rate Limit=Maximum
Gain=388
Exposure=80.0000ms
GPS=On
Timestamp Frames=On
Target Temperature=-10
Banding Threshold=35
Banding Suppression=21
EQMOD ASCOM HEQ5/6=RA=08:19:55,Dec=+04:04:21 (JNOW)
SharpCapVersion=4.0.8218.0

StartCapture=2022-01-11T23:57:59.7927026Z
MidCapture=2022-01-12T00:00:29.8337026Z
EndCapture=2022-01-12T00:02:59.8752290Z

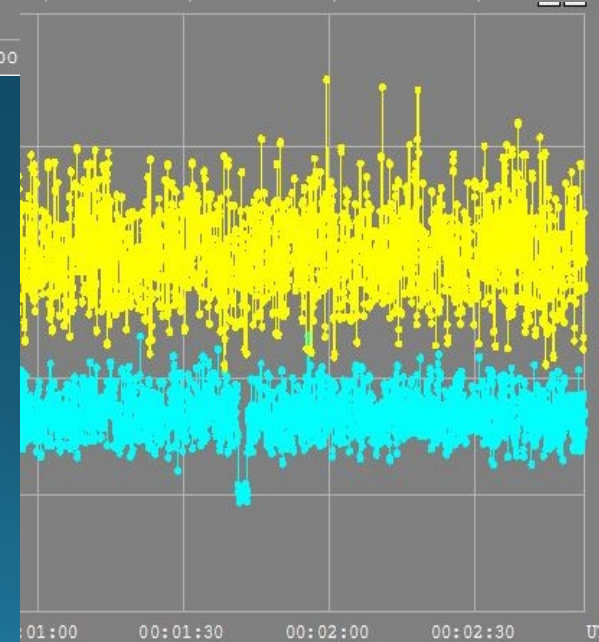
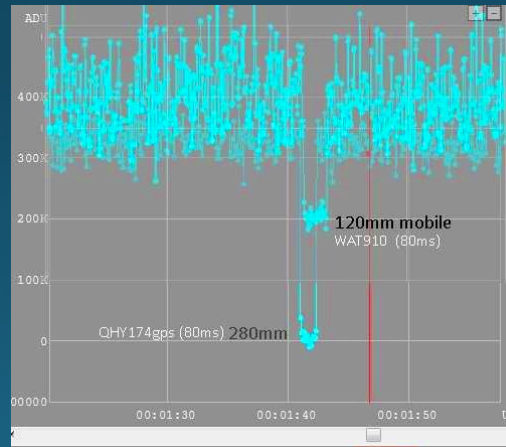
Duration=300.083s
FrameCount=3746

SEQUENCE
PROMPT FOR TARGET
WAIT UNTIL LOCALTIME 2358
CAPTURE START
DELAY 300
CAPTURE STOP
PLAY SOUND Alert
END SEQUENCE



C11 - QHY
0.08s

1.36 sec



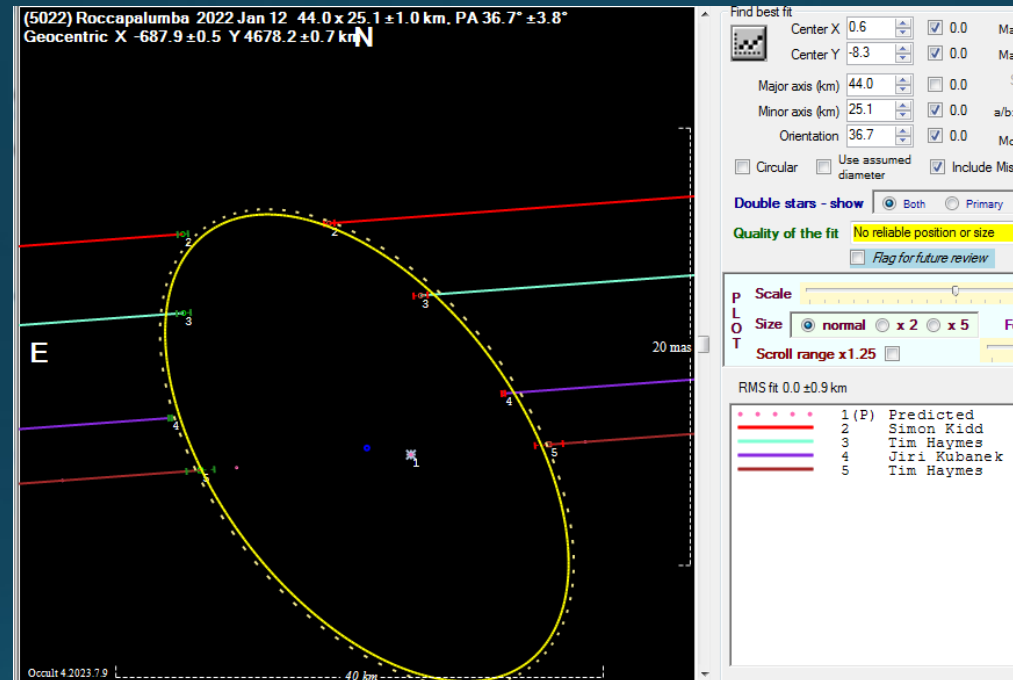
12cm - WAT
0.08s

2.00 sec

Tangra, Credit: Hristo Pavlov

(5022) Roccapalumba 2022-01-12 profile

Occult: observed chords



Credit: Eric Frappa Euraster data:-

Occult4: Credit: D Herald

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2022/01/12 | 5022 | Roccapalumba | 4UC471-038681
chords
asteroid measurement: at least 29 km

P+ | JPL#50:2021-Nov-09 | 00:01:40 | 00:01:40 | | | | W 01 00 00 | N 51 44 35 | 0 | WS |
O+ | Tim Haymes | 23:58:00 | 00:03:00 | L120 | VID | UK | W 01 26 58.5 | N 51 45 51.2 | 75 | WS |
2.00 | 00:01:41.28 | 0.08 | 00:01:43.28 | 0.08 | GPS++ | | | | |
O+ | Tim Haymes | 23:58:00 | 00:03:00 | M280 | CCD | UK | W 01 18 47.1 | N 51 55 40.3 | 122 | WS |
1.36 | 00:01:41.13 | 0.04 | 00:01:42.49 | 0.04 | GPS++ | | | | |
Remote observation.;
O+ | Simon Kidd | 00:00:35 | 00:02:35 | M350 | CCD | UK | W 00 03 51.7 | N 51 57 04.4 | 120 | WS |
0.84 | 00:01:35.79 | 0.03 | 00:01:36.63 | 0.03 | GPS++ | | | | |
O+ | Jiri Kubanek | 23:58:18 | 00:02:27 | M200 | CCD | CZ | E 15 21 11.7 | N 50 48 41.2 | 903 | WS |
1.91 | 00:00:21.05 | 0.01 | 00:00:22.96 | 0.01 | GPS++ | | | | |
    
```

Dual/mobile observations in SODIS

- quick count -

Jiri Kubanek (CZ) (10856) Bechstein

Anna Marciniak (PL) (34) Circe, (4138) Kalchas, (76093)2000 DP96

Lionel Rousselot (FR) (65803) Didymos

Andreas Schweizer (CH) (153) Hilda

Thank you