

Grazing star occultations by the moon

Björn Kattentidt

ESOP 44 Poznań, Poland

August 23/24, 2025

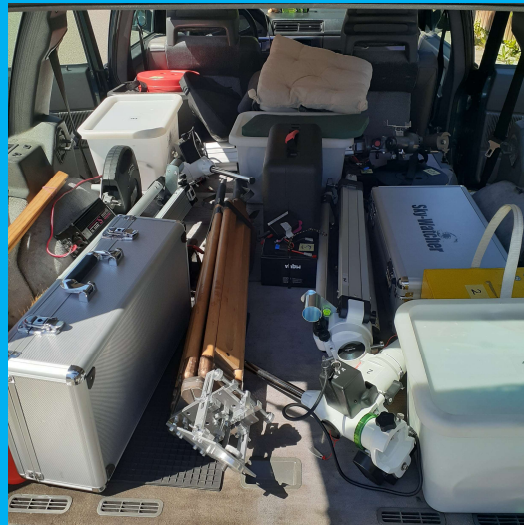
...per aspera ad astra

1 April 2025, Galgenen near Zurich

Maia (Pleiades) 3.9 mag

Partial success: **1 out of 4 systems**: (12+ contacts)

- System characteristics
- Videos
- Results



1 May 2025, Straubing near Regensburg

SAO 78480 7.5 mag

Complete success: **3 out of 4 systems**, 37+ contacts! :)



Hans Joachim Bode's system ... used and inexpensive

Type: Maksutov-Cassegrain (100€)

Optics: 1000/100, F10 aperture ratio

Mount: RA motor

Camera: Watec 910HX (720x576, 8 bit)
(700€)

Time measurement:
VTI Sven Andersson (50€)
(+ GPS 1PPS flasher)

Recording: 25fps
YUKON recorder (150€)

Table, stool, plastic bag, small battery

Total costs: 1000 €

Start-up approx. 20 min.



EvoStar 72 ED

... the new and best

Type: Refractor, ED Apochromat (500€)

Optikcs 420/72, **F 5,8 aperture ratio**

Mount: SkyWatcher EQ3 pro (700€)

Camera: Watec 910HX (720x576, 8 bit)
(700€)

Time measurement:
VTI Sven Andersson (50€)

Recording: 25fps (**50fps**)

Video grabber, (50€)

Laptop (? €)

Table, stool, plastic bag,
Small + **VERY large battery** + inverter

Total costs: **2000 € + laptop**

Start-up approx. **40 min.**



Seestar S50 ... the modern and the practical one

Type: **System refractor**

Triplet apochromat (700€)

Optics: 250/**50 (!)**, **F 5 aperture ratio**

Mount: Systemic on equatorial wedge

Camera: 4k (1020x1980), 12 bit

Time measurement:

GPS 1PPS flasher, OccultFlashTag app

Recording: mode x1 **12,5fps maximum**
(mode x2 < **50fps?**, mode x4 < 100fps)
AVI, 10 minutes maximum!

Table, stool, plastic bag, **NO battery**

Total costs : **700 €**

+ used mobile phone(150€)

Start-up approx. **10 Min.**



...gadgets?

Polaris laser pointer

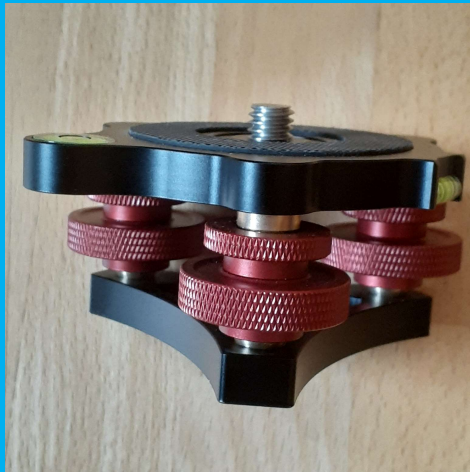
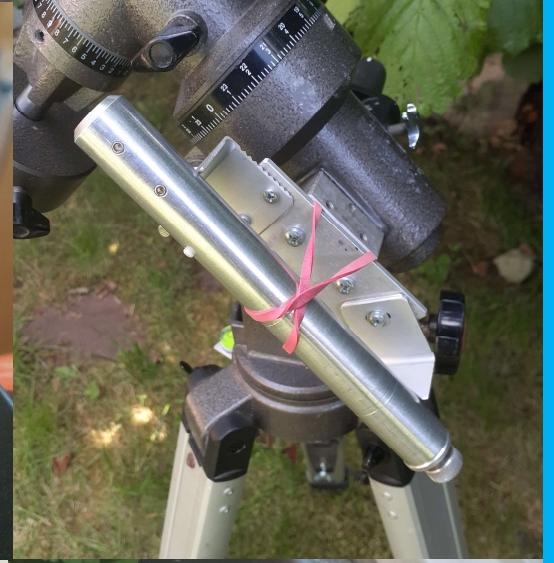
GPS 1PPS flasher

OccultFlashTag app

Adjustable wedges

Spirit level

Levelling base



Maia (Pleiades)
1 April 25
4 mag
SAO 76155

Seestar S50

Lunar occultation predictions : Occult v4.2024.9.5

with Prediction ...

Set Output filter

Mag limit adjustment...

show Recording Timer

Weather forecasts...

Help

Exit

1. Specify a single site location

Site name

Lon 8 52 8

Lat 47 10 54

Altitude (m) 430

Apert (cm) 5

Use Site files

2. Star cat.

XZ

XZ < mag 9

XZ < mag 7

XZ < mag 4

ZC

3. Objects

Stars

Planets

Asteroids

Grazes only

Doubles only

4. Set UT dates

Year Month Day

Start 2025 Apr 1

End 2025 Apr 1

Starting at -6 hrs

0 hrs

+6 hrs

+12hrs

5. Events for Site

Multisite predictions

Set output format

Long output lines

Short output lines

Close

6. Events anywhere

World map

output

[2025 Apr 1]

Right-click on prediction for further options

Occultation prediction for

E. Longitude 8 52 8.0, Latitude 47 10 54.0, Alt. 430m; Telescope dia 5cm; dMag 0.0

day	Time	P	Star	Sp	Mag	Mag	%	Elon	Sun	Moon	CA	PA	VA	AA	Libration	A	B	RV	Cct	durn	R.A. (J2000)	Dec	Mdist	SV									
y	m	d	h	m	s	No	D	v	r	i	l	l	Alt	Alt	Az	o	o	L	B	m/o	m/o	"/s	o	sec	h	m	s	o	m	s	Mm	m/s	
25	Apr	1	20	55	41.0	D		537SB6	3.7	3.8s	16+	47	13	291	88N	71	27	83	+3.5	-5.5	+0.0	-0.9	.607	10.8		3	44	52.5	24	6	48	362.71087.5	
R537 = Electra = 17 Tauri																																	
537 is multiple: ** 3.9 7.5 0.20" 117.0, dT = +0.22sec : Aa,Ac 3.9 7.5 0.20" : Aa,Ab 3.9 7.0 25.9" : AB 3.7 13.0 98" 144.0, dT = +48sec																																	
537 has been reported as non-instantaneous (OCcl693). Observations are highly desired																																	
537 = NSV 15755, 3.70, range 0.00, 1Kp, Type SPB, Period 1.1073 days																																	
25	Apr	1	21	7	53.2	d		536pB7	5.5	5.5	16+	47	11	294	42N	26	342	38	+3.5	-5.5	+0.6	+0.6	.346	56.5		3	44	48.2	24	17	22	363.01104.1	
R536 = Celaeno = 16 Tauri																																	
536 is triple: AB 5.4 13.2 89" 264.5, dT = -132sec : AC 5.4 11.5 218" 196.1, dT = -619sec																																	
25	Apr	1	21	28	54.5	D		545SB6	4.1	4.2v	16+	48	8	297	46S	117	75	129	+3.5	-5.5	-0.6	-1.8	.525	-35.1		3	46	19.6	23	56	54	363.41131.1	
R545 = Merope = 23 Tauri																																	
545 is quadruple: Aa,Ab 4.1 8.1 0.30" 111.0, dT = +0.6sec : AB 4.2 14.4 110" 180.2, dT = +95sec : AC 4.2 12.9 147" 336.0, dT = -219sec																																	
545 is a close double. Observations are highly desired																																	
545 = V0971 Tau, 4.18, range 0.01, 1Kp, Type SPB LERI, Period 0.4881 days																																	
25	Apr	1	21	44	36	Gr		541SB8	3.9	3.9s	16+	48	5	**	GRAZE: CA 8.6N; Dist. 2km in az. 35deg. [Lat = 47.20-0.48(E.Long-8.87)]																		
25	Apr	1	21	44	37	Gr		541SB8	3.9	3.9s	16+	48	6	300	9N	352	312	4	+3.5	-5.5	+9.9	+9.9	.000	90.0		3	45	49.6	24	22	4	363.71152.3	
R541 = Maia = 20 Tauri																																	
541 is quadruple: Aa,Ab 4.4 5.4 : AB 3.8 13.7 113" 72.7 : AB 3.8 13.7 113" 72.8																																	
541 = NSV 1279, 3.87, range 0.00, 4Kp, Type ACV, Period 10.288 days																																	
25	Apr	1	21	50	48.8	D		552SB7	2.9	2.9s	16+	48	5	300	73S	90	50	102	+3.5	-5.5	-0.4	-1.1	.650	-8.0		3	47	29.1	24	6	18	363.81158.6	
R552 = Alcyone = eta Tauri																																	
552 is multiple: Aa,Ab 3.0 4.6 : AB 1.6 0.031" 207.1, dT = -0.02sec : AE 2.8 15.0 78" 232.4, dT = -95sec : AB 2.8 6.3 118" 291.1, dT = -169																																	
552 is a close double. Observations are highly desired																																	
552 = NSV 15775, 2.87, range 0.00, 1Kp, Type ROT+SPB, Period 2.2925 days																																	

25 Apr 1 21 44 37 Gr 541SB8 3.9 3.9s 16+ 48 6 300 9N 352 312 4 +3.5 -5.5 +9.9+9.9

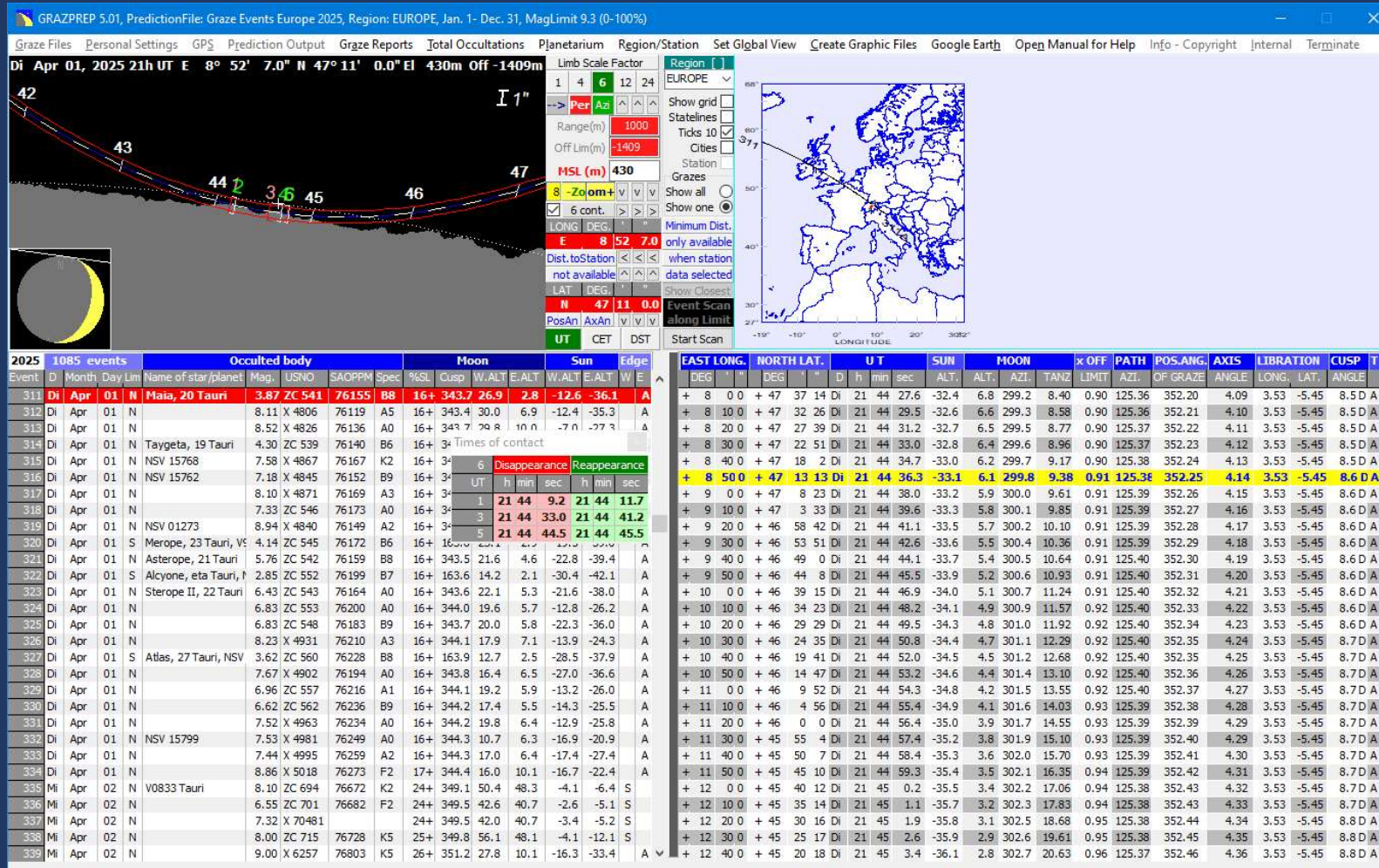
R541 = Maia = 20 Tauri

541 is quadruple: Aa,Ab 4.4 5.4 : AB 3.8 13.7 113" 72.7 : AB 3.8 13.7 113" 72.8

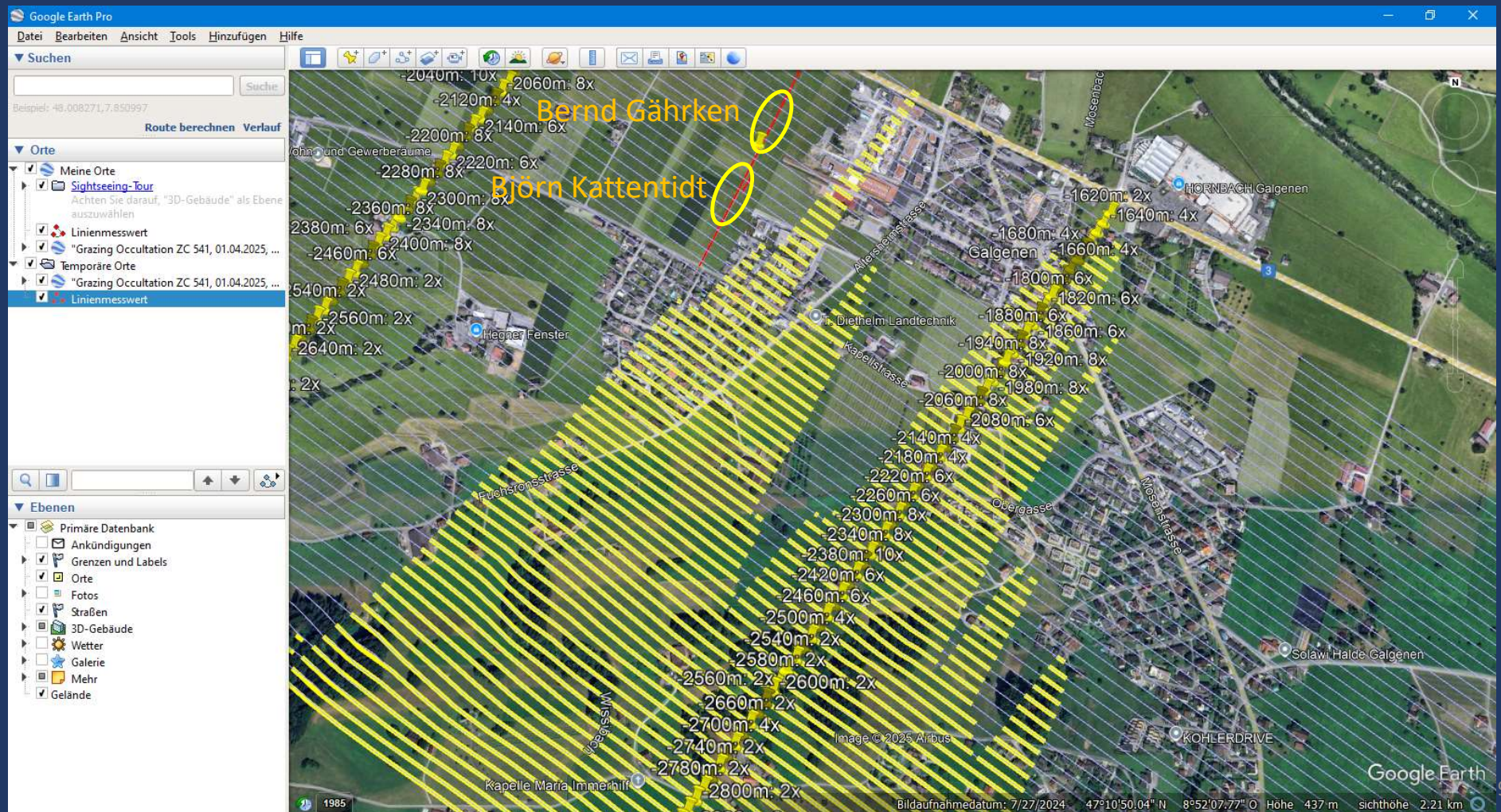
541 = NSV 1279, 3.87, range 0.00, 4Kp, Type ACV, Period 10.288 days

7

Observation planning with GRAZPREP by Eberhard Riedel



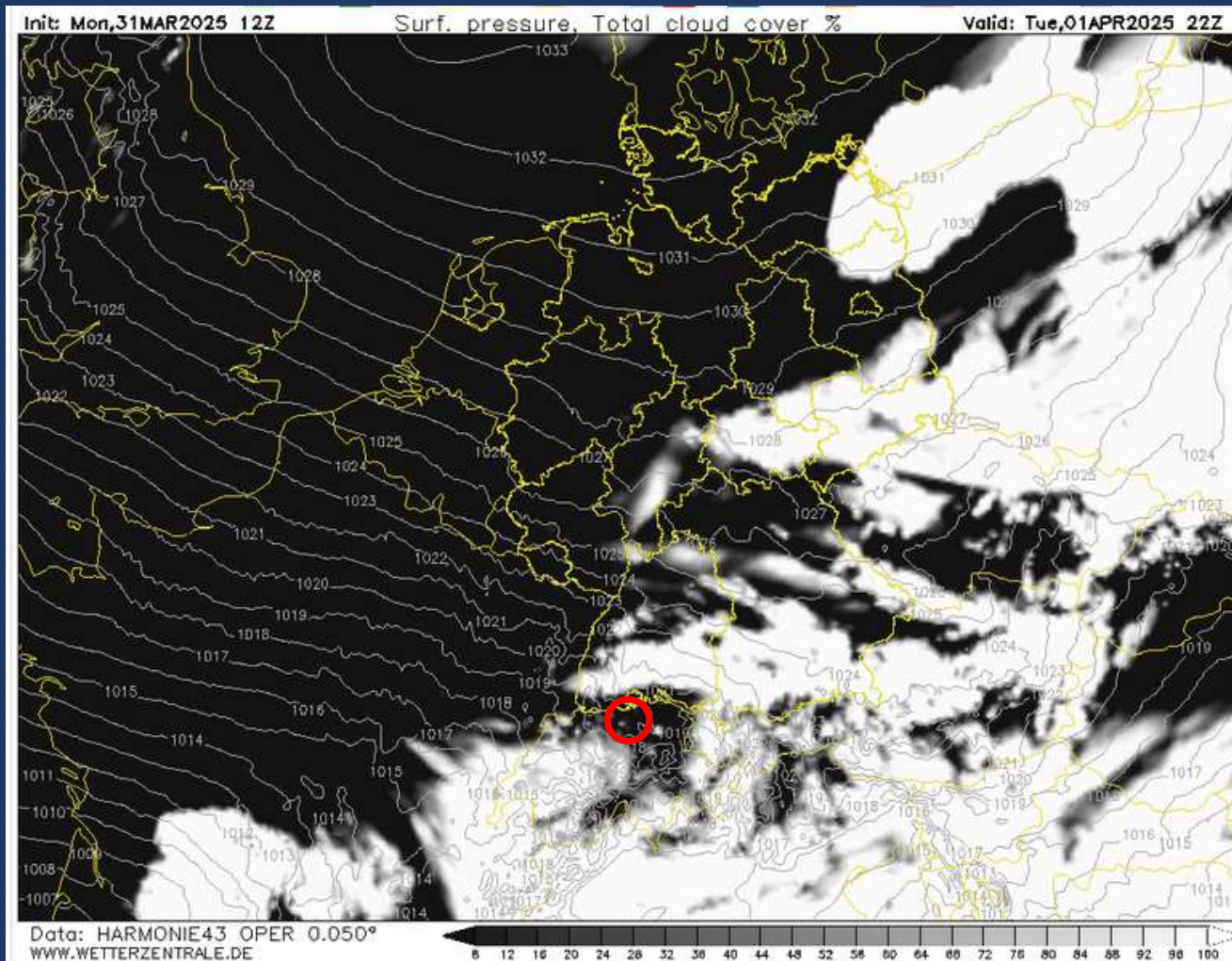
Galgenen near Zürich – location planning, plot: GRAZPREP



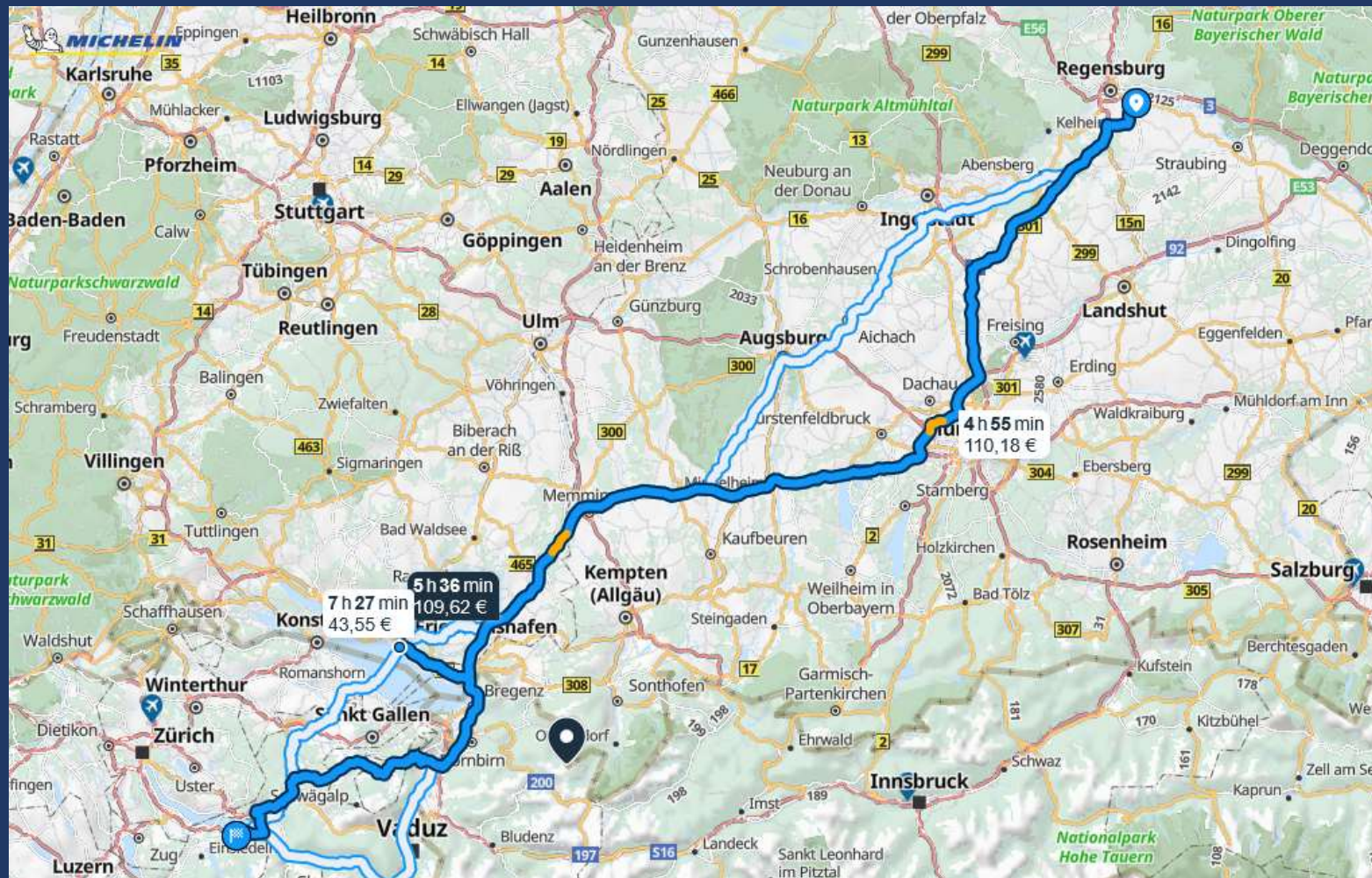
Weather observation with meteoblue...



Total cloud cover with HARMONIE of wetterzentrale.de



Travel planning with viamichelin.de ...

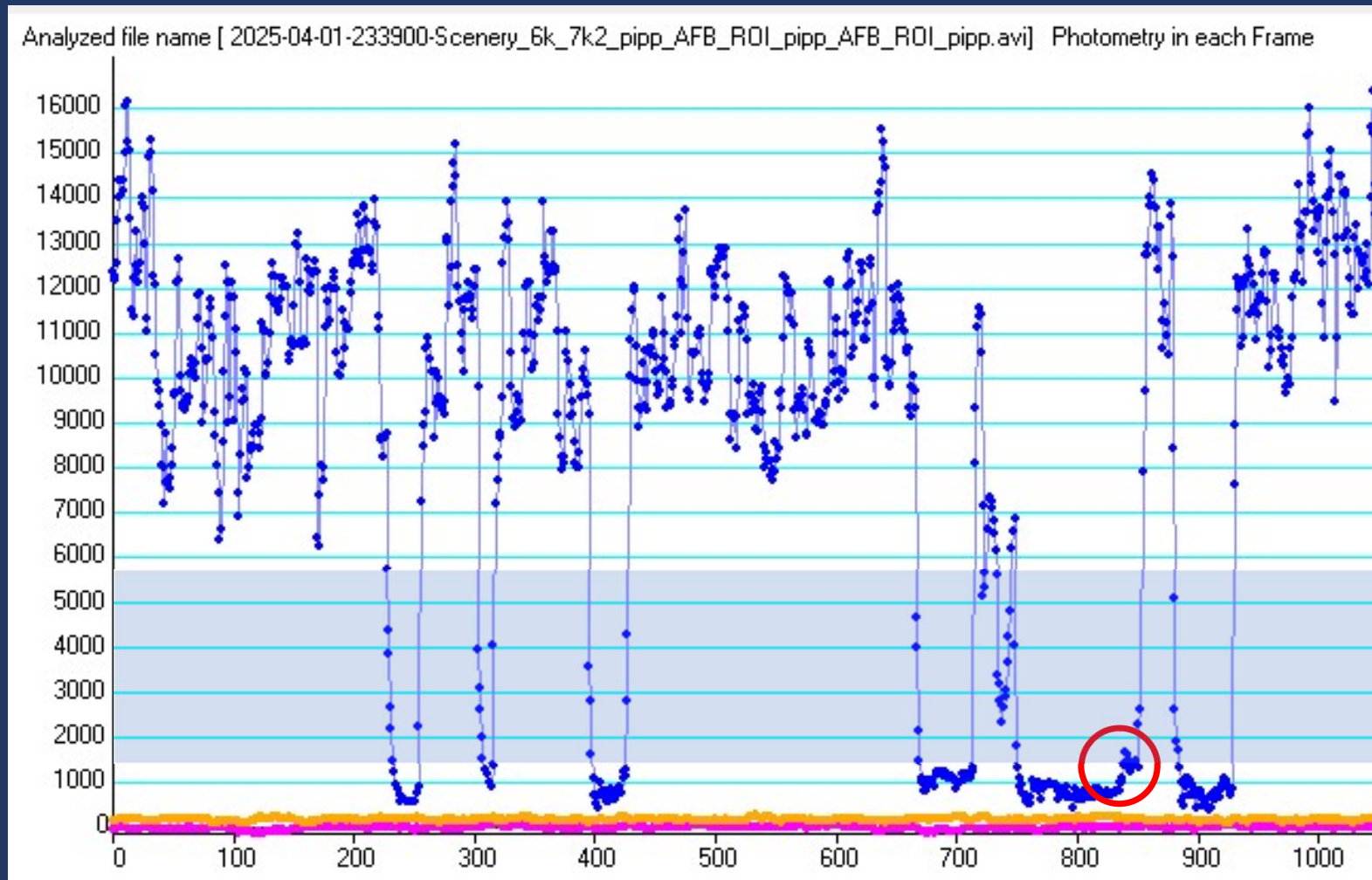


Maia (Pleiades), [1 April 25](#)
SAO 76155
Seestar S50 azimuthal, mp4

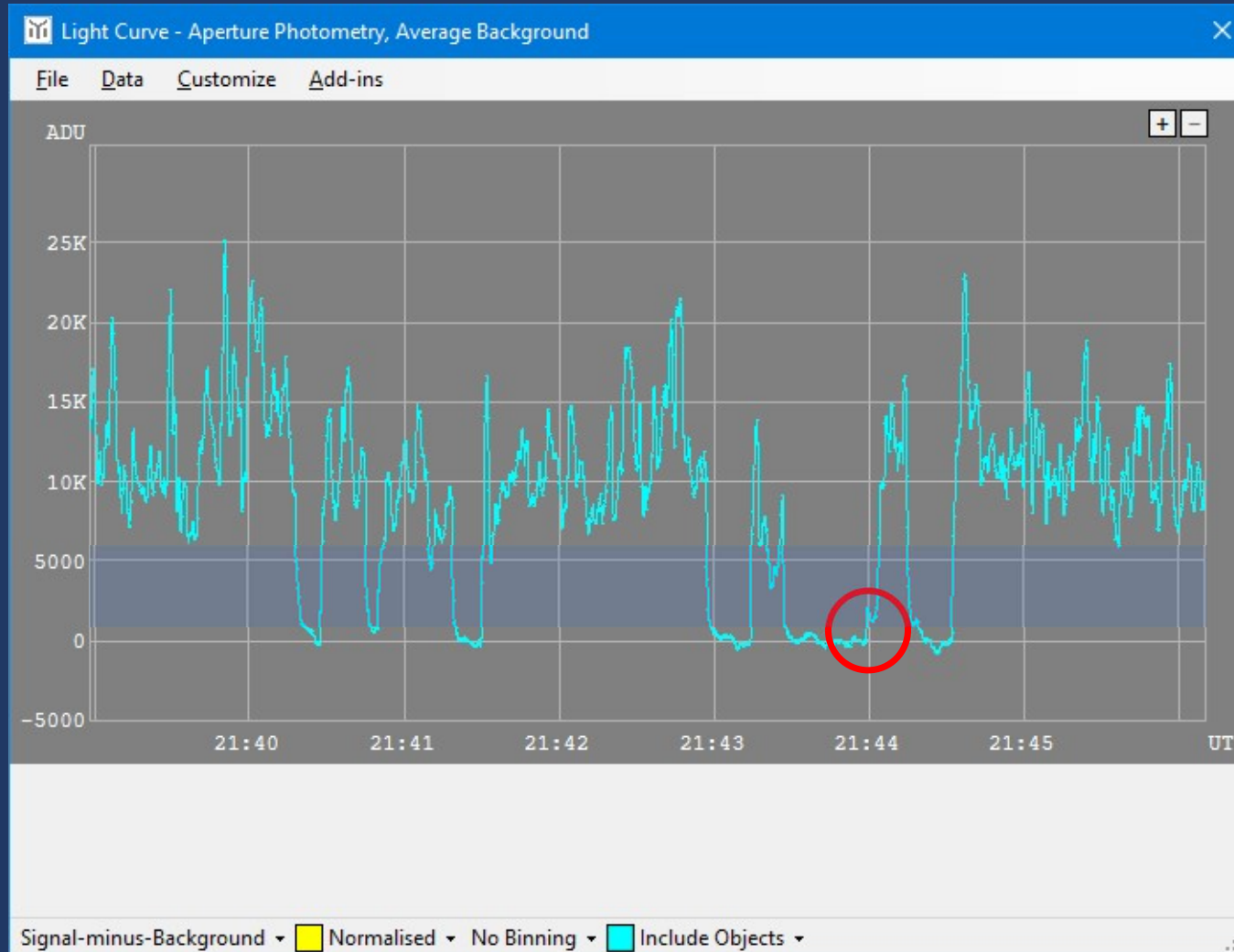
19 contacts detected !



Light curve evaluation with LIMOVIE using diffraction analysis



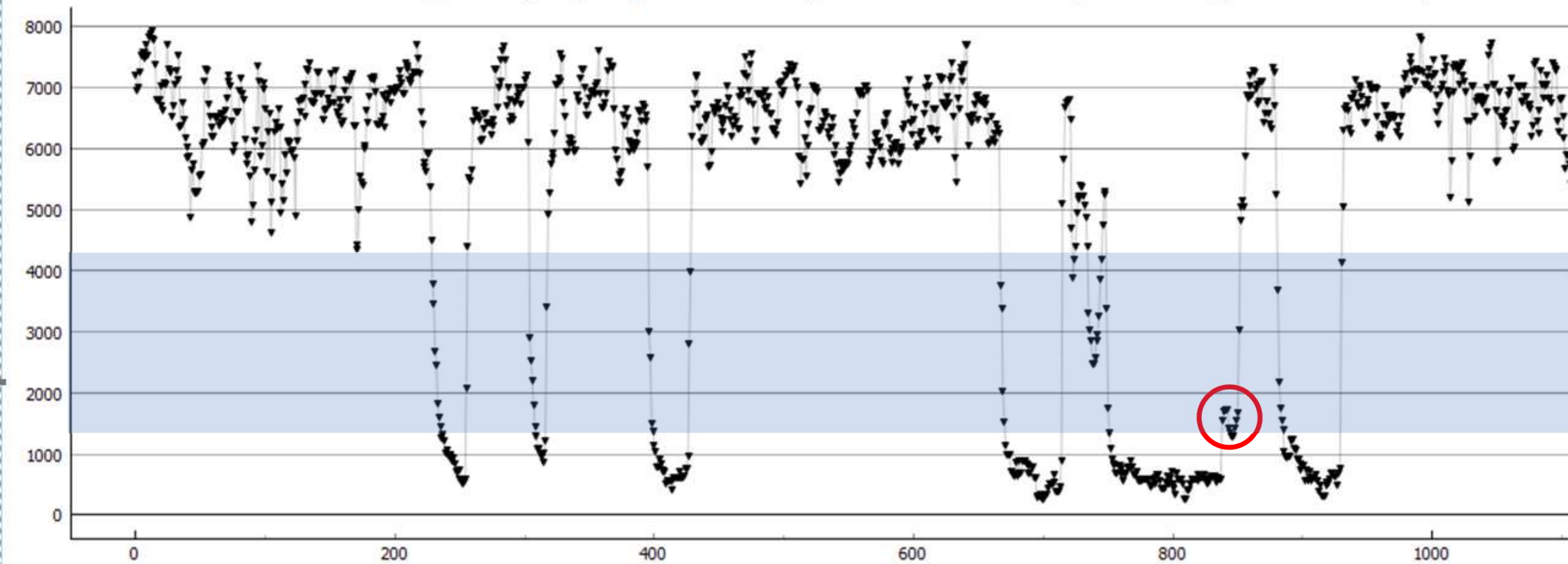
Light curve using Tangra – bad result to not possible



Light curve using PyMovie / PyOTE

PyMovie 4.0.7 lightcurve for aperture: static_occlun using Aperture Photometry

static_occlun signal (background subtracted) at frame 1176.0: intensity=6618 mask_pixels=37 timestamp=



Official report finally (draft)

Restrictive report format
but supported by GRAZPREP

19 events!

Report not sent double against
Bernd Gährken since timing
of my station was not reliable!

Place name Zuerich ,Galgenen
Email address bjoern@kattentidt-astro.de
Representative Bjoern Kattentidt
Message Maybe component C of SAO 76155 detected?
Several fluctuating events apparent.
Timing issue: constant deviation +-1sec possible!

```
TA RAD 5 25 + 852 8.5 +471055.2 84 427 M
OA B. Kattentidt bjoern@kattentidt-astro.de
202504012144 8.09 S 76155 DDG UA00.05 25.5 112 8
instantaneous: 1 intermediate value
202504012144 8.39 S 76155 RDG UA00.05 25.5? 111 8
double star?: 4 values level, comp B of 76155 occulted?
202504012144 10.69 S 76155 DDG UA00.05 25.5? 112 8
double star?: 6 values level, comp B of 76155 occulted?
202504012144 11.04 S 76155 DDG UA00.05 15.5 F111 8
gradual?: 7 intermediate values
202504012144 12.39 S 76155 RDG UA00.05 16.8 112 8
instantaneous: 2 intermediate values
202504012144 14.8 S 76155 DDG UA00.05 16.8 F111 8
gradual?: 5 intermediate values
202504012144 15.5 S 76155 RDG UA00.05 16.4? 112 8
instantaneous: 1 intermediate value
202504012144 19.4 S 76155 DDG UA00.05 16.4 111 8
gradual?: 4 intermediate values
202504012144 21.01 S 76155 RDG UA00.05 13.3 112 8
instantaneous: 2 intermediate values
202504012144 33.03 S 76155 DDG UA00.05 13.3? F111 8
gradual?: 4 intermediate values
202504012144 35.38 S 76155 RDG UA00.05 13.4 112 8
instantaneous: 0 intermediate value
202504012144 35.78 S 76155 DDG UA00.05 23.4 112 8
instantaneous: 1 intermediate value, partial drop?
202504012144 36.38 S 76155 DDG UA00.05 23.4 F111 8
gradual?: 2 intermediate values and partial drop?
202504012144 36.93 S 76155 RDG UA00.05 23.4 111 8
gradual?: 3 intermediate values and partial reappear?
202504012144 37.13 S 76155 DDG UA00.05 13.4 112 8
gradual?: 3 intermediate values
202504012144 41.59 S 76155 RDG UA00.05 23.4 112 8
partial R?: comp C of SAO 76155? rised level 13 values?
202504012144 42.24 S 76155 RDG UA00.05 13.4? 112 8
gradual or double star effect?: 5 intermediate values
202504012144 43.69 S 76155 DDG UA00.05 13.4 F111 8
gradual?: 6 intermediate values
202504012144 46.15 S 76155 RDG UA00.05 13.4 112 18
instantaneous: 2 intermediate values
```

Finally, results from
Mitsuru Soma from Japan,
translated ☺

Star-eating ☺ [English](#)

Star-eating reference site

- ☺ [Japan Regional Coordinator](#) for [Star Meal Observations](#) (Significance of Star-E
- ☺ [HAL Hoshiken](#) operated by [Tutomu Hayamizu](#) (forecast and results of bunks
- ☺ [IOTA](#) (International Association of Observers)

Forecasts for close-up

[Click here for the forecast of the close-up](#)

As a result of the delivery of the food ☺ The comparison
June 18, 2025 (UT) ZC 3412 (Hungary)

☺ [Results \(LRO\) \(Reduction\)](#)

May 7, 2025 (UT) ZC 1658 (Japan)

☺ [Results \(LRO\) \(Reduction\)](#)

May 1, 2025 (UT) SAO 78480 (Germany)

☺ [Results \(LRO\) \(Reduction\)](#)

April 1, 2025 (UT) ZC 541 (U.K. and Switzerland)

☺ [Results \(LRO\) \(Reduction\)](#)

March 3, 2025 (UT) ZC 297 (France)

mitsurusoma.higoyomi.com

ING Tags Postbank mb 5Tage Wetter RegRad DH, DJI UAVs AMS74 web W Wiki LEO Shelly XS

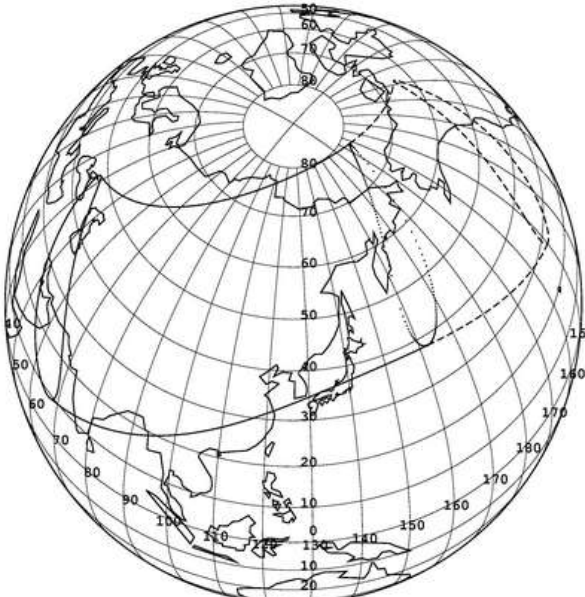
ここは 相馬 充 (Mitsuru SÔMA) のホームページです

HOME
星食 (Occultations)
相馬充の解説

JAXA月周回衛星「かぐや」のレーザ高度計による月面地形データ関連の資料:
☺ 「かぐや」の月縁を用いた2012年金環日食予報
☺ 接食による月縁との比較 (英語)
☺ 2009年7月22日皆既日食時の月縁

☺ 国立天文台 (NAOJ)

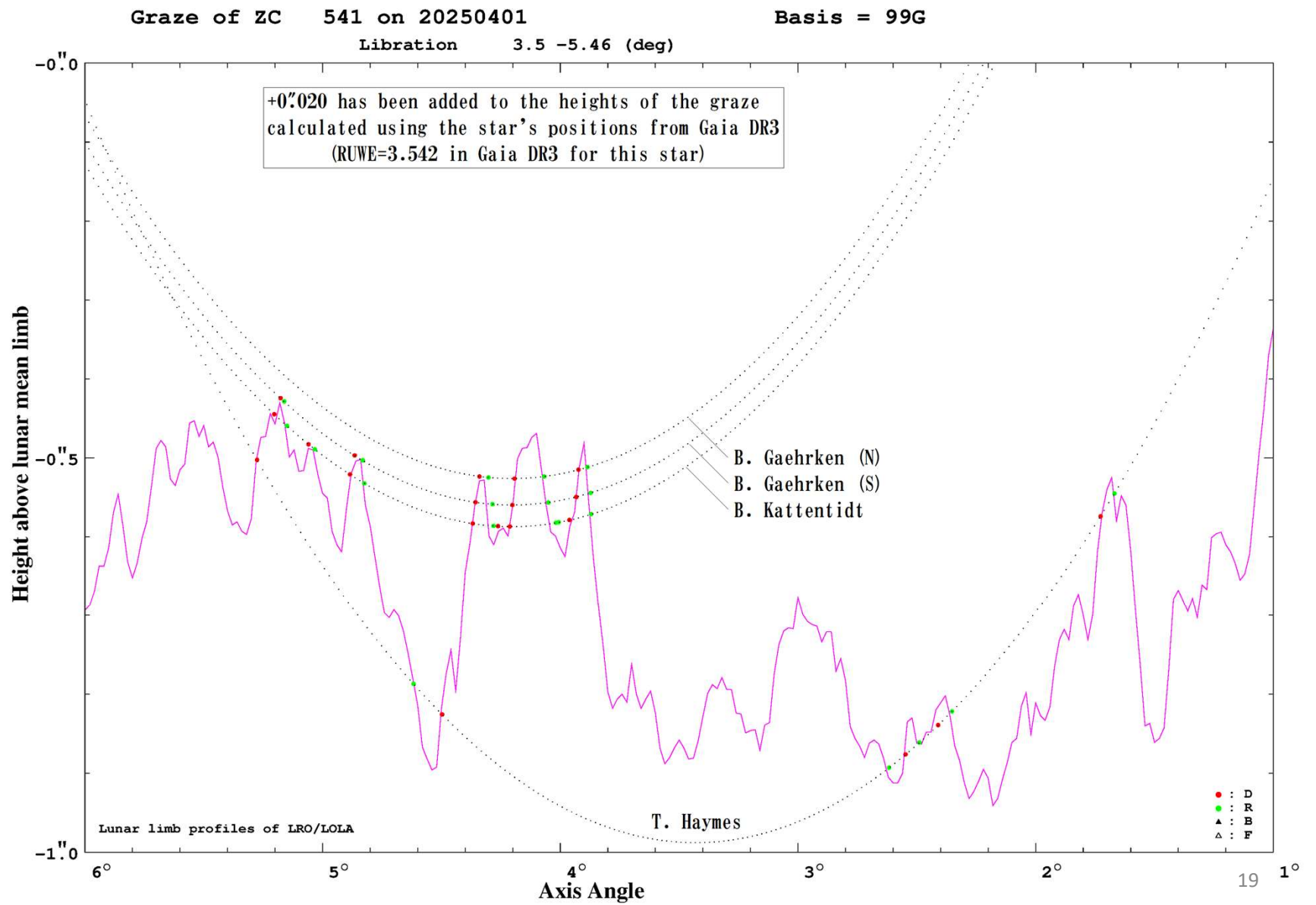
星食の見られる範囲を示す図の例 (破線側は昼間)



2017年10月10日にアルデバランの星食が見られる地域
Lunar Occultation of Aldebaran on 2017 Oct 10

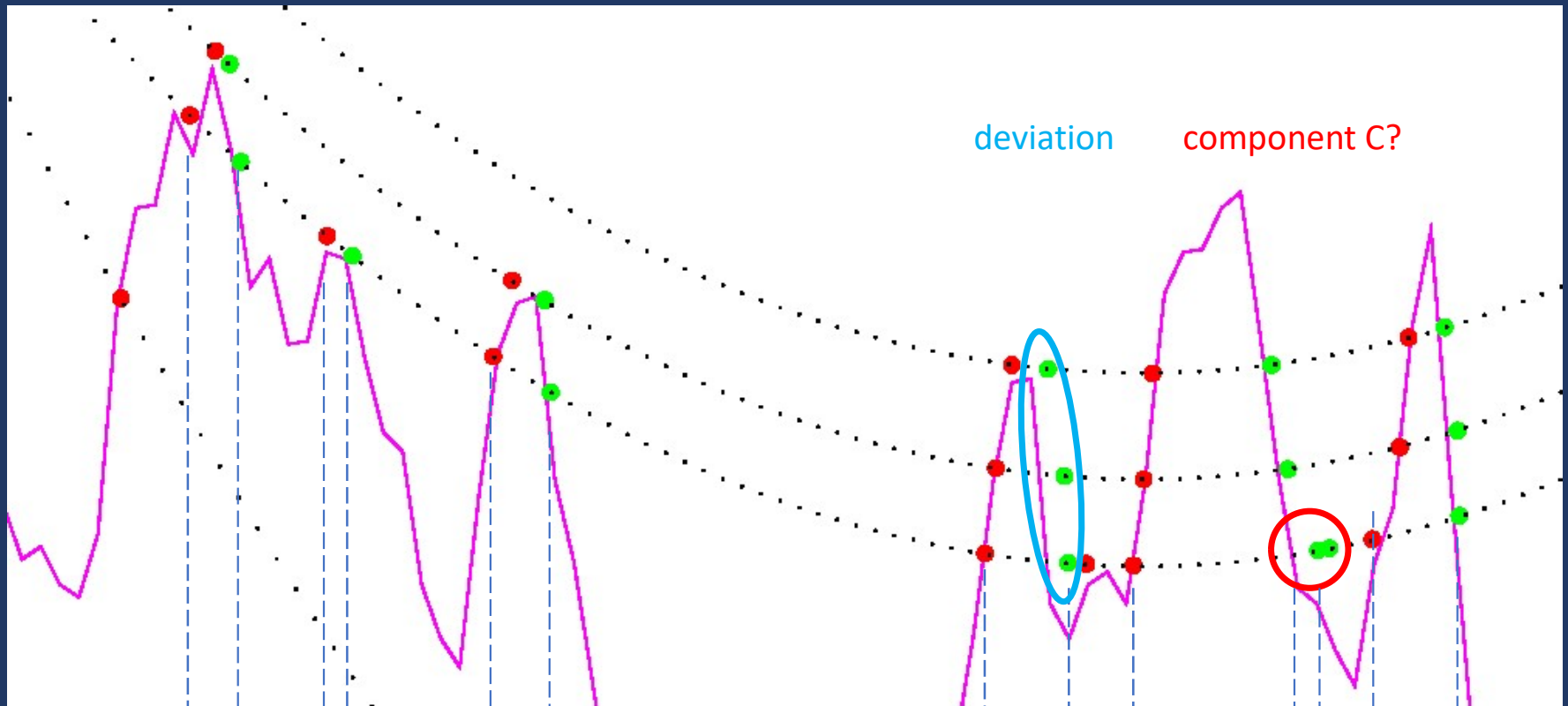
当ホームページに関するご意見・ご質問は
mitsuru.soma@gmail.com
↑お願いします。

Results
by
Mitsuru
Soma



Comparison:

professional
calculated
moon
limb



observed
light curve





SAO 78480
1 May 25
7,5 mag

HJB Maksutov
EvoStar 72 ED
Seestar S50

Lunar occultation predictions : Occult v.4.2024.9.5

with Prediction ... Set Output filter Mag limit adjustment... show Recording Timer Weather forecasts... Help Exit

1. Select site for predictions: Europe.site -11.7 to 60.4, 19.4 to 67.8 Roma, Italy Filter search to sites in file

2. Star cat. XZ XZ < mag 9 XZ < mag 7 XZ < mag 4 ZC

3. Objects Stars Planets Asteroids Grazes only Doubles only

4. Set UT dates Start 2025 May 1 Starting at -6 hrs 0 hrs +6 hrs +12hrs End 2025 May 1 Today

5. Events for Site Occultations Short Output Apply Filter

6. Events anywhere Grazes Multi-site for 1 star output World map [2025 May 1]

Right-click on prediction for further options

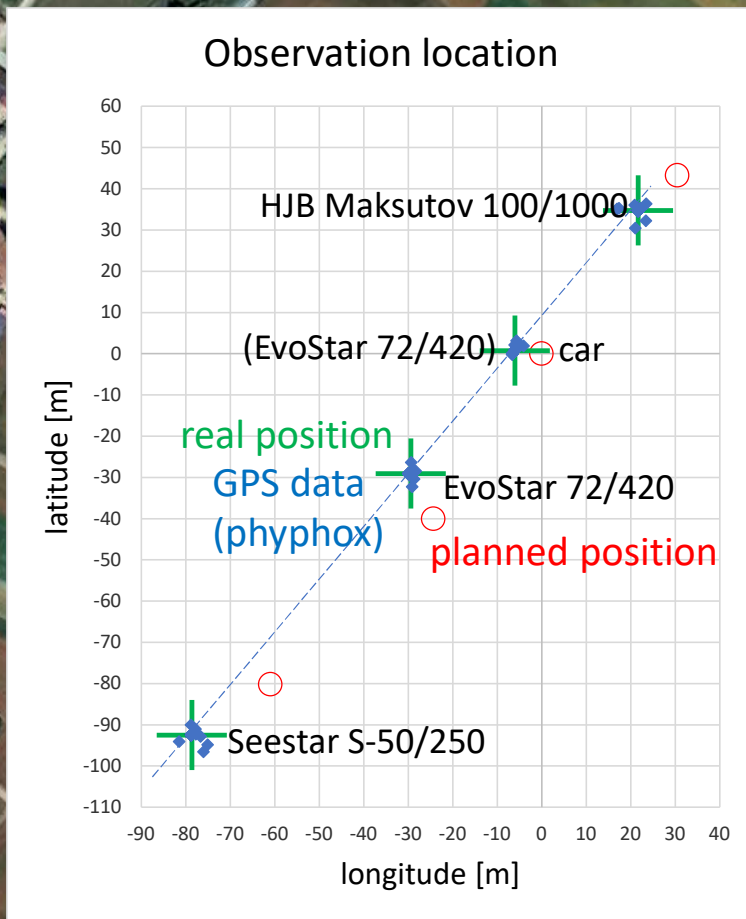
Occultation prediction for Roma, Italy
E. Longitude 12 27 6.0, Latitude 41 55 18.0, Alt. 162m; Telescope dia 15cm; dMag 0.0

day	Time	P	Star	Sp	Mag	Mag	%	Elon	Sun	Moon	Cusp	angle	Distance	Azimuth	Path	formula
y	m	d	h	m	s	No	D	v	r	V	ill	Alt	Alt	o	km	
25 May	1	19	30	40.8	D	78410	K1	7.7	7.1	21+	55	34	278	31S	148	92 146 +6.1 -6.0 -0.3-2.7 .374 -45.1 6 28 32.2 27 38 4 368.0 946.0
25 May	1	19	55	6.7	d	78434	K0	8.6	7.8	21+	55	30	282	45S	134	79 132 +6.1 -6.0 -0.2-2.2 .470 -31.0 6 29 44.3 27 37 32 368.5 979.7
25 May	1	21	11	53.4	D	78480	cK5	7.5	6.7	22+	56	17	292	49N	49 358	46 +6.1 -5.9 +0.6-0.2 .358 53.8 6 33 2.1 27 49 31 370.11088.7
78480 is double: ** 8.3 8.3 0.10" 63.0, dT = +0.27sec																
78480 has been reported as non-instantaneous (OCc 720). Observations are highly desired																
25 May	1	22	27	37.6	d	1013	cG0	7.0		22+	57	4	303	41S	140	95 137 +6.2 -5.7 -0.8-1.7 .517 -38.5 6 36 26.3 27 16 42 371.81190.9
1013 is double: AB 7.14 8.97 0.70" 271.6, dT = -0.9sec																
1013 is a close double. Observations are highly desired																

25 May 1 21 11 53.4 D 78480cK5 7.5 6.7 22+ 56 17 292 49N 49 358 46 +6.1 -5.9 +

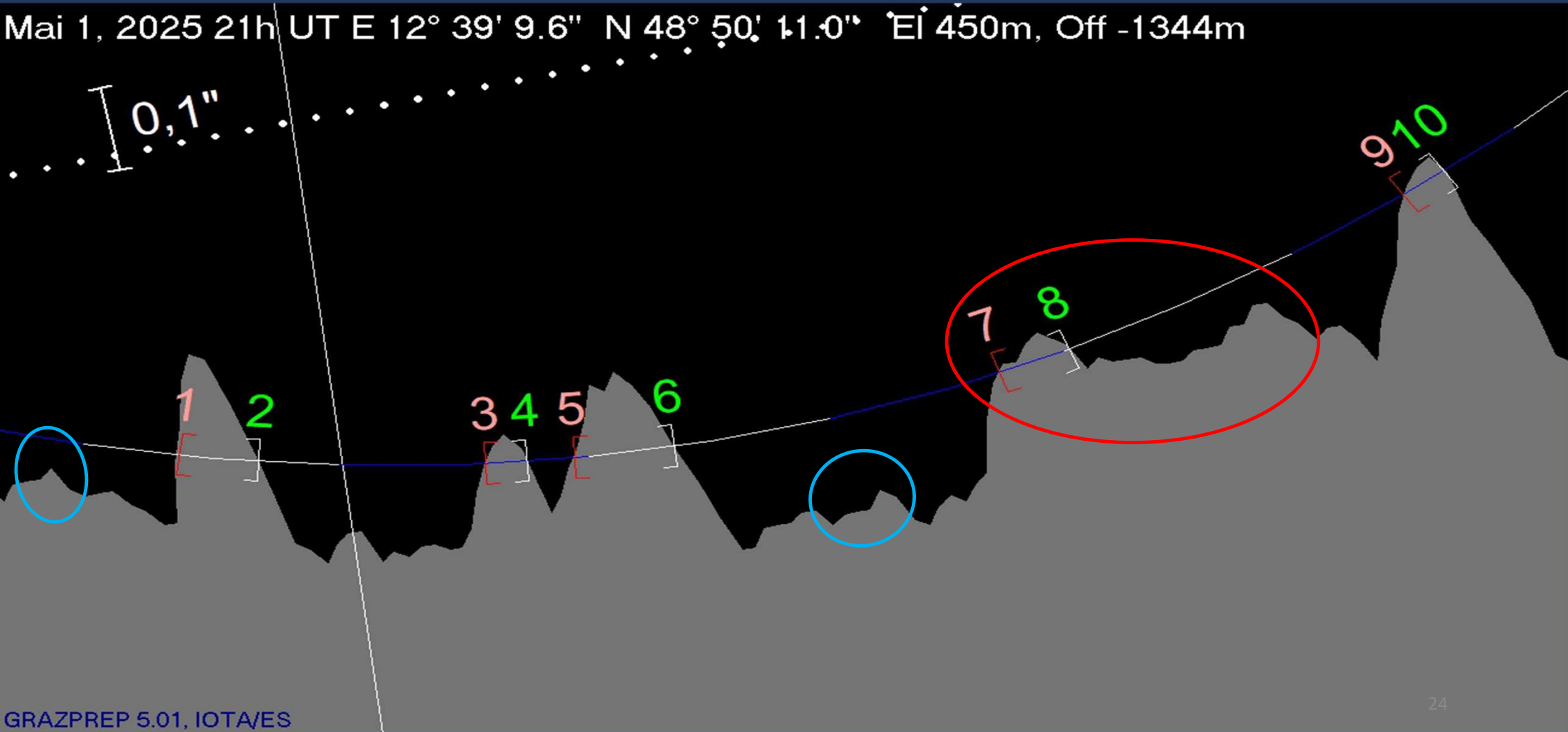
78480 is double: ** 8.3 8.3 0.10" 63.0, dT = +0.27sec

78480 has been reported as non-instantaneous (OCc 720). Observations are highly desired



Observation planning: GRAZPREP prediction

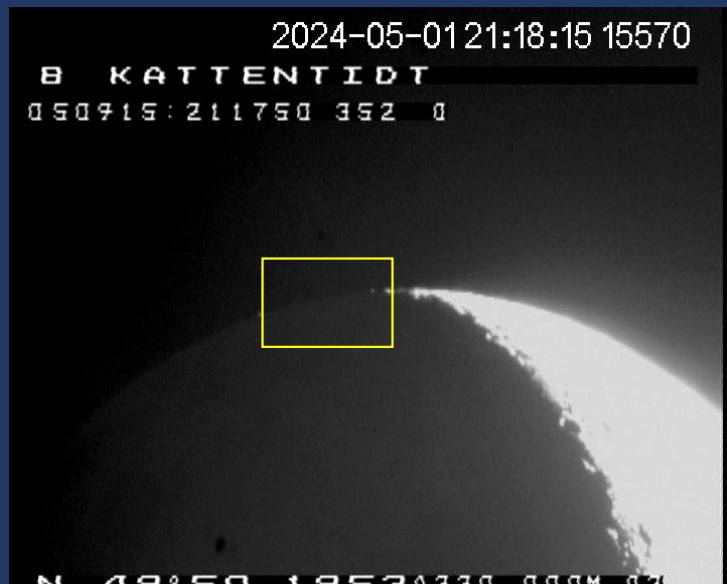
Mai 1, 2025 21h UT E 12° 39' 9.6" N 48° 50' 11.0" EI 450m, Off -1344m



SAO 78480, 1 May 2025

HJB Maksutov + Watec910HX + YUKON recorder

8 events detected

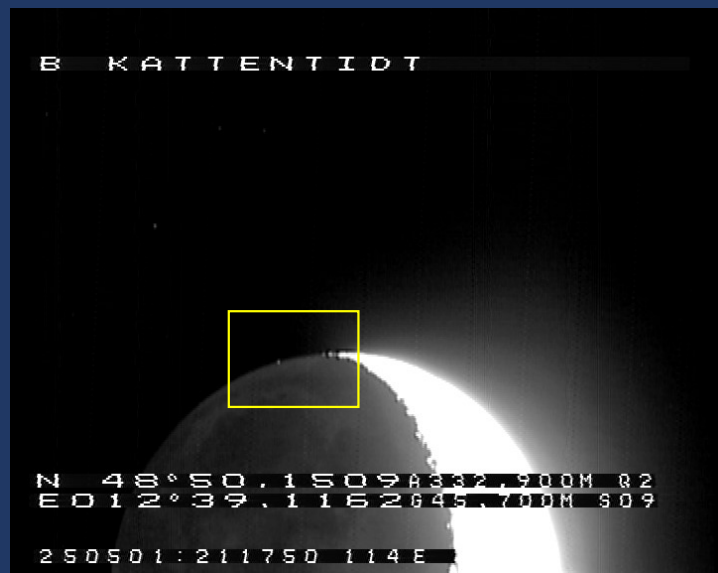


100mm F10 25fps

SAO 78480, 1 May 2025

EvoStar 72 ED + Watec910HX + video grabber + WinXP laptop

12 events detected



72mm F5,8 25fps

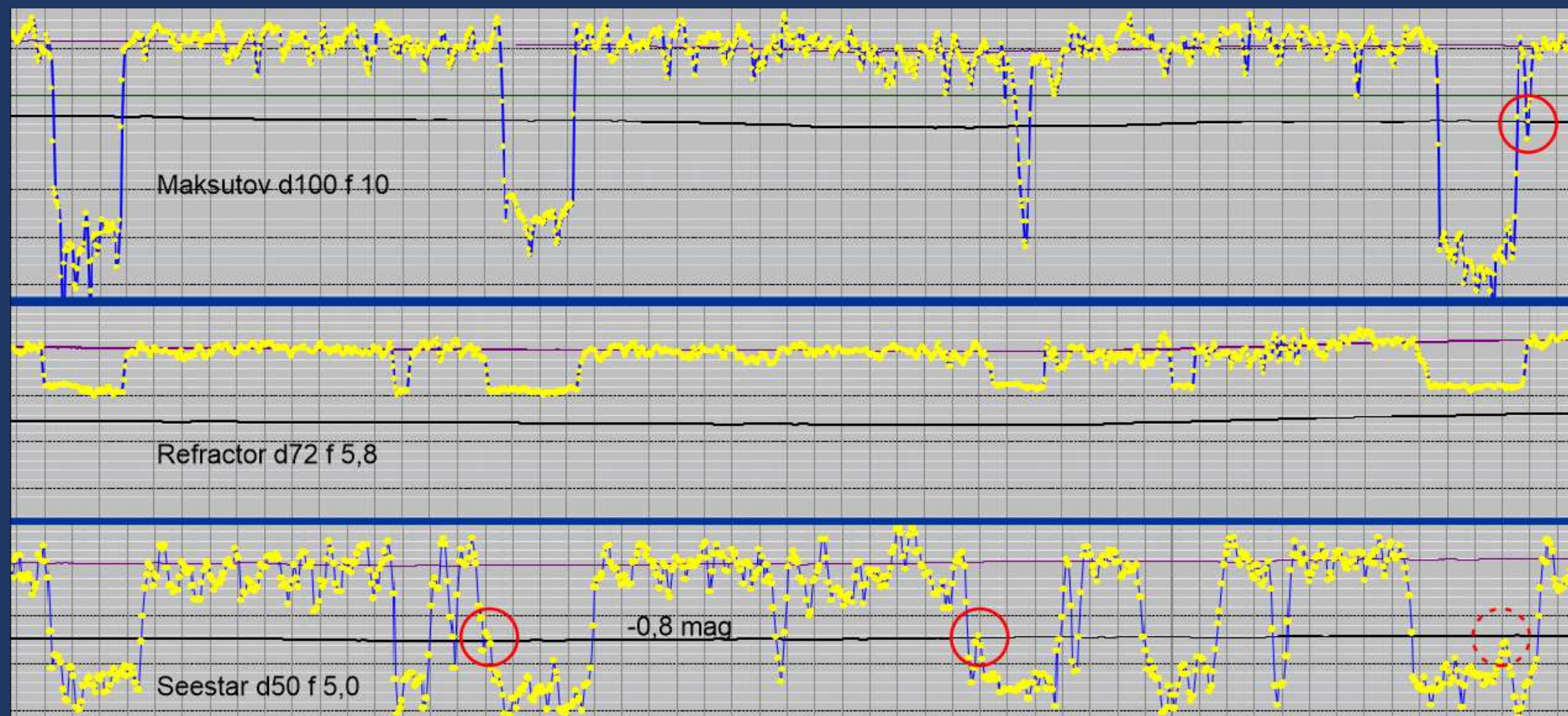
SAO 78480, 1 May 2025

Seestar S50 – equatorial monted

17 events detected

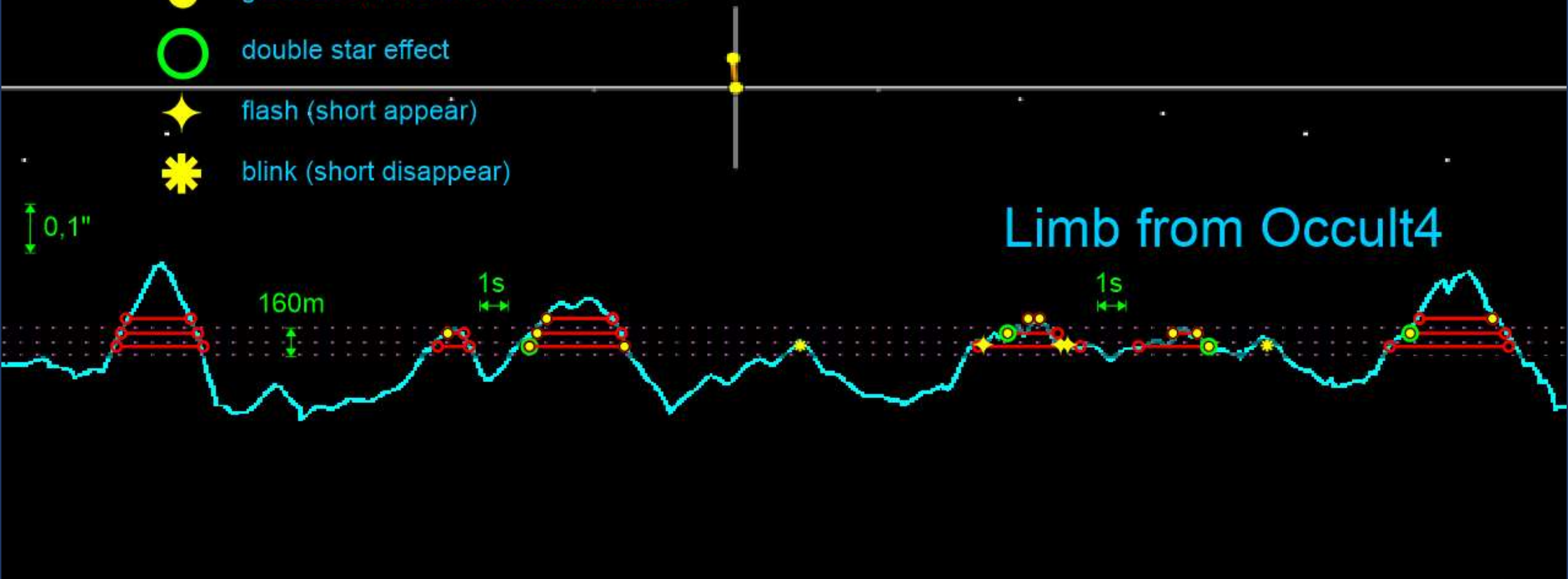


7,5 mag 50mm! MP4 ☹️



Double star effect?

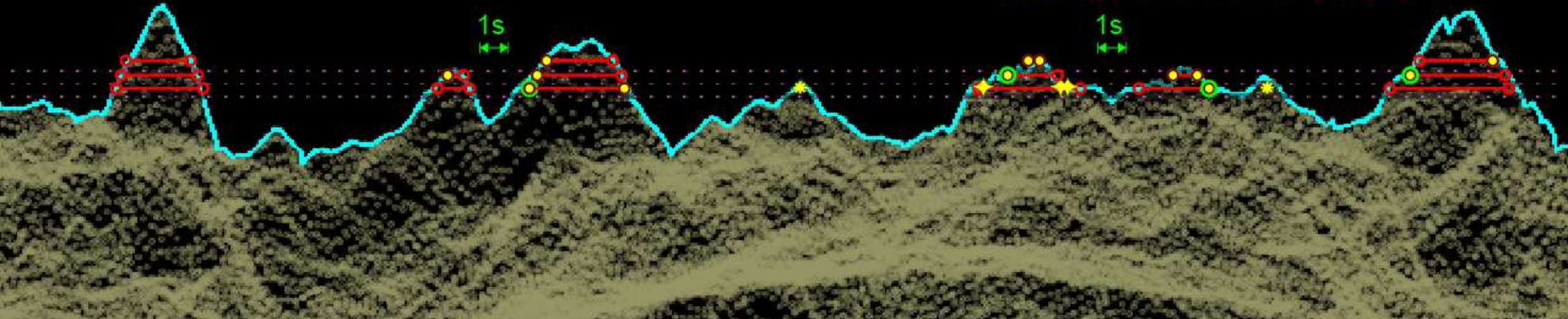
- gradual: several intermediate values
- double star effect
- ✦ flash (short appear)
- ✳ blink (short disappear)



Comparison:
Occult4 prediction vs. observation

- gradual: several intermediate values
- double star effect
- ✦ flash (short appear)
- ✳ blink (short disappear)

Limb from Occult4



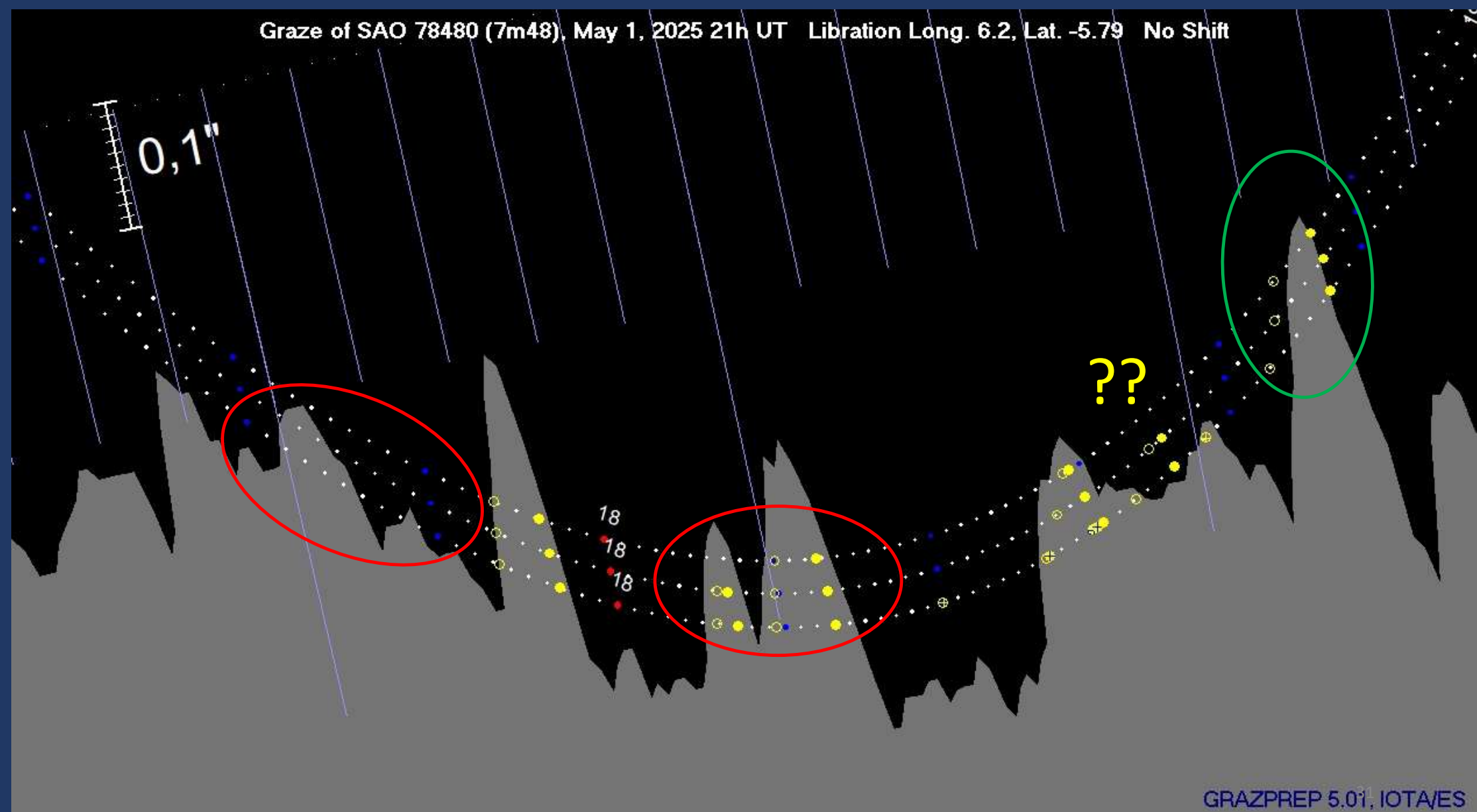
... with terrain view

Graze of SAO 78480 (7m48), May 1, 2025 21h UT Libration Long. 6.2, Lat. -5.79 No Shift

0,1"

??

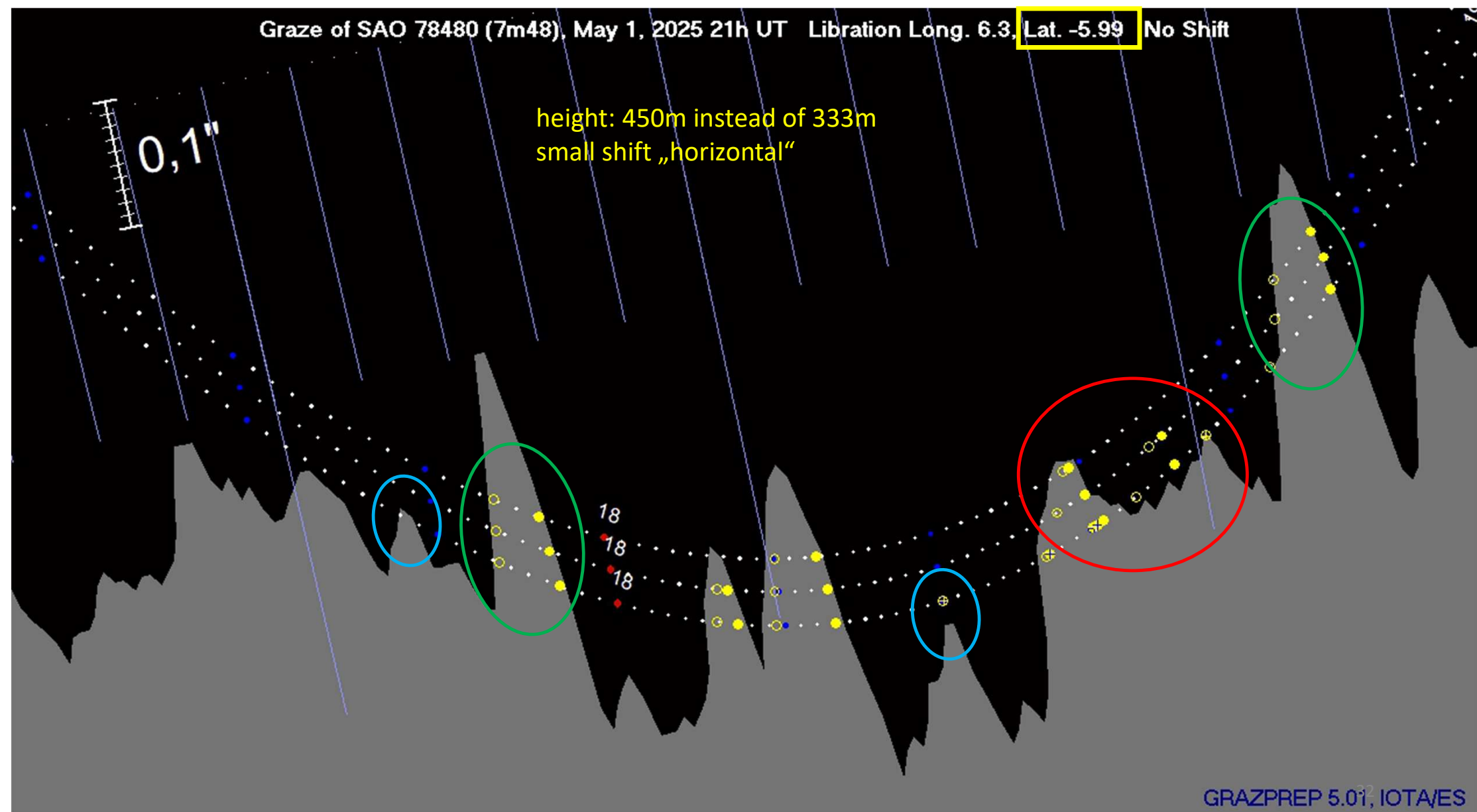
18
18
18



Graze of SAO 78480 (7m48), May 1, 2025 21h UT Libration Long. 6.3, Lat. -5.99 No Shift

height: 450m instead of 333m
small shift „horizontal“

0,1"



Graze of SAO 78480 (7m48), May 1, 2025 21h UT Libration Long. 6.3, Lat. -6.13 No Shift

0,1"

no blink

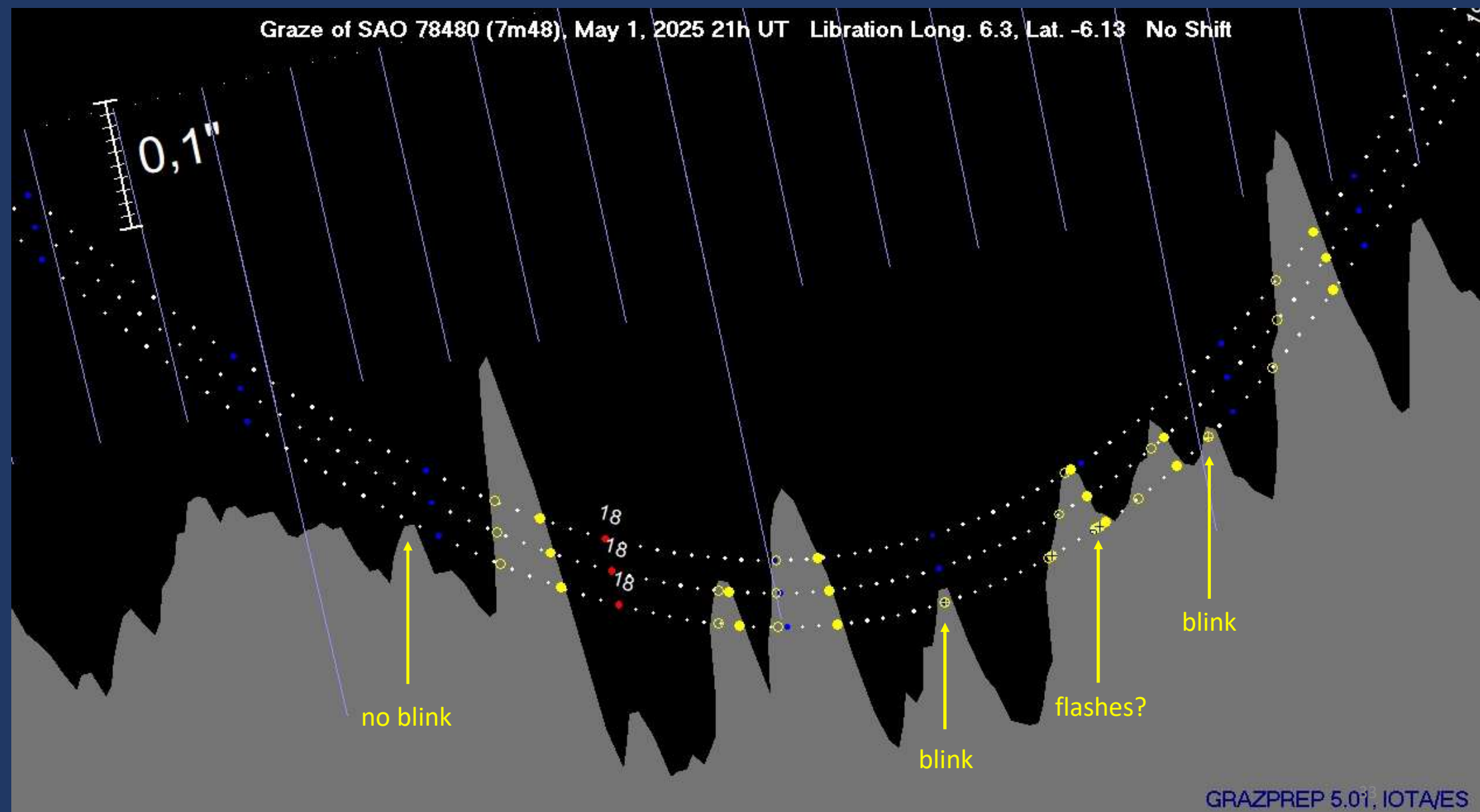
18
18
18

blink

flashes?

blink

GRAZPREP 5.01, IOTA/ES



Official report

8 + 12 + 17
events!

Place name Straubing ,Niederharthausen
Email address bjoern@kattentidt-astro.de
Representative Bjoern Kattentidt
Message

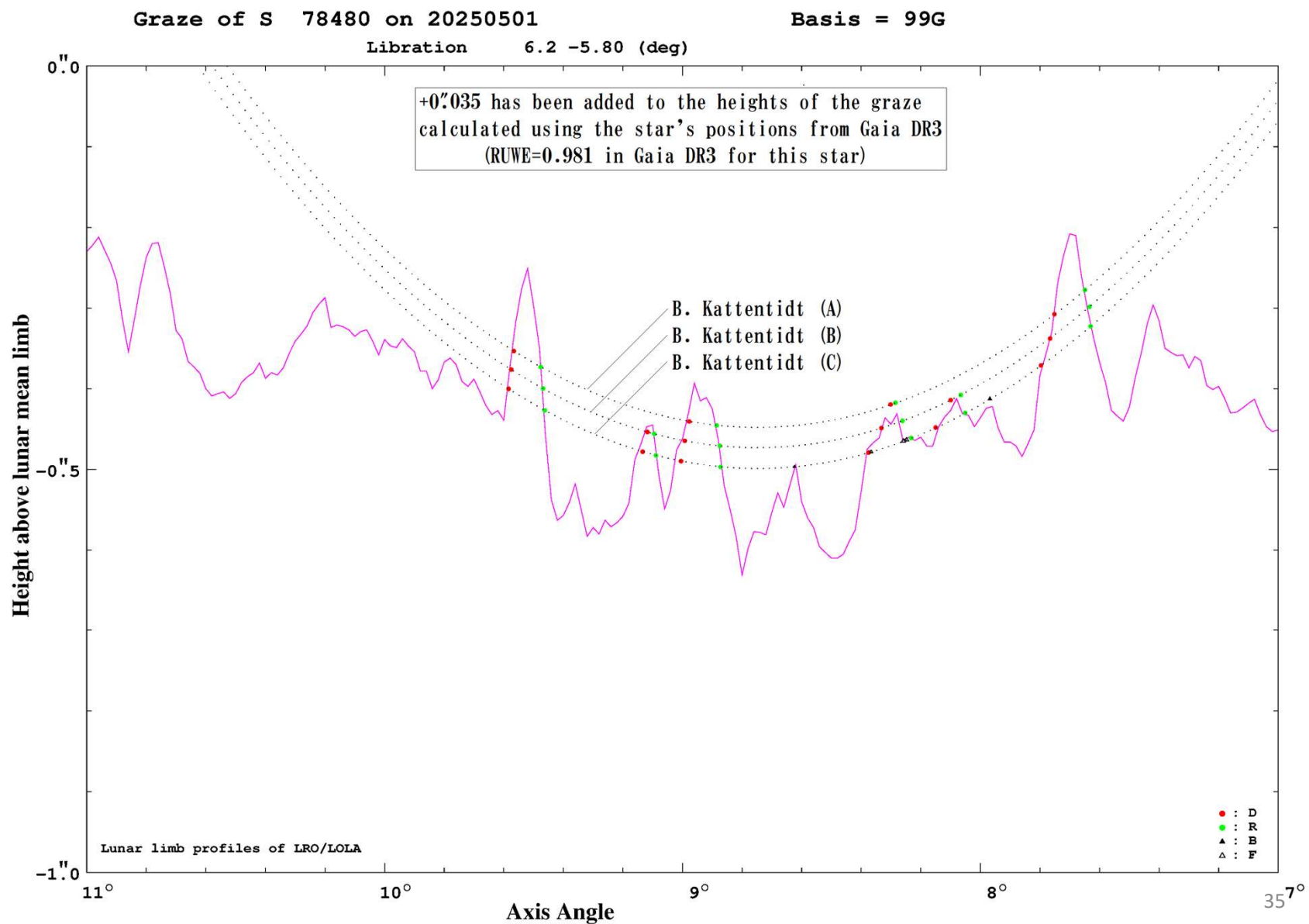
TA	CED	10	100	+	1239	9.6	+4850	11.0	84	335	M
TB	RED	7	42	+	1239	7.1	+4850	9.0	84	335	M
TC	RED	5	25	+	1239	4.6	+4850	6.9	84	335	M

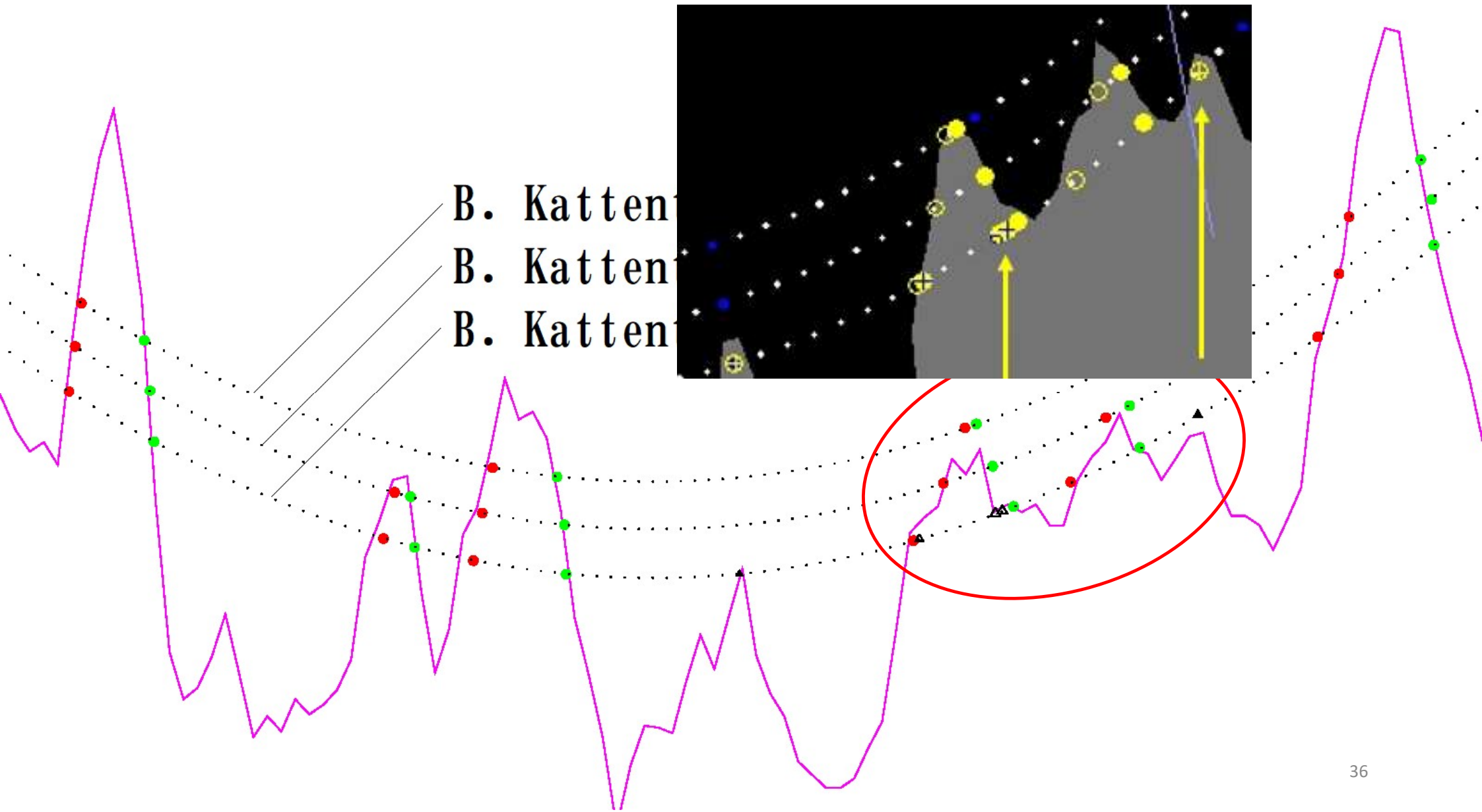
OA B. Kattentidt bjoern@kattentidt-astro.de
OB B. Kattentidt bjoern@kattentidt-astro.de
OC B. Kattentidt bjoern@kattentidt-astro.de

2025	5	1211753.74	S	78480	DDG	G	G0.01216.7		T112	18AA	
instantaneous: 1 intermediate value											
2025	5	1211756.25	S	78480	RDG	G	G0.0031		T112	18AA	
instantaneous: 0 intermediate values											
2025	5	1211810.11	S	78480	DDG	G	G0.02318.0	0.120T111	18AA		
gradual?: 3 intermediate value											
2025	5	1211812.67	S	78480	RDG	G	G0.0071		T112	18AA	
instantaneous: 0 intermediate values											
2025	5	1211828.86	S	78480	DDG	G	G0.12916.9	0.320T111	18AA		
gradual: 8 intermediate values											
2025	5	1211829.31	S	78480	RDG	G	G0.0141	0.160T111	18AA		
gradual: 4 intermediate values											
2025	5	1211844.09	S	78480	DDG	G	G0.00117.8		T112	18AA	
instantaneous: 0 intermediate values											
2025	5	1211846.94	S	78480	RDG	G	G0.0471	0.120T111	18AA		
gradual?: 3 intermediate values											
2025	5	1211753.55	S	78480	DDG	G	G0.00419.9		T112	18BA	
instantaneous: 1 intermediate value											
2025	5	1211756.53	S	78480	RDG	G	G0.0011		T112	18BA	
instantaneous: 0 intermediate values											
2025	5	1211806.26	S	78480	DDG	G	G0.04119.9	0.120F111	18BA		
gradual?: 3 intermediate values											
2025	5	1211806.89	S	78480	RDG	G	G0.0011		T112	18BA	
instantaneous: 0 intermediate value											
2025	5	1211809.75	S	78480	DDG	G	G0.00319.9	0.120T111	18BA		
gradual?: 3 intermediate values											
2025	5	1211813.02	S	78480	RDG	G	G0.0021		T112	18BA	
instantaneous: 0 intermediate values											
2025	5	1211828.06	S	78480	DDG	G	G0.05619.9F0.160T111	18BA			
double star?: 4 intermediate values											
2025	5	1211830.01	S	78480	RDG	G	G0.0071		F112	18BA	
instantaneous: 1 intermediate value											

2025	5	1211834.50	S	78480	DDG	G	G0.02	19.9	0.120F111	18BA	
gradual?: 3 intermediate values											
2025	5	1211835.44	S	78480	RDG	G	G0.0091		0.120T111	18BA	
gradual?: 3 intermediate values											
2025	5	1211843.74	S	78480	DDG	G	G0.02719.9F0.360F111	18BA			
gradual?: 9 intermediate values											
2025	5	1211847.43	S	78480	RDG	G	G0.0031		T112	18BA	
instantaneous: 1 intermediate value											
2025	5	1211753.36	S	78480	DDG	V	G0.04	12.4		T112	18CA
instantaneous: 0 intermediate values											
2025	5	1211756.74	S	78480	RDG	V	G0.07612.4		T112	18CA	
instantaneous: 0 intermediate values											
2025	5	1211805.87	S	78480	DDG	V	G0.04512.4		T112	18CA	
instantaneous: 1 intermediate values											
2025	5	1211807.11	S	78480	RDG	V	G0.59712.4		T112	18CA	
instantaneous: 0 intermediate values											
2025	5	1211809.45	S	78480	DDG	V	G0.53512.4B0.400T111	18CA			
gradual?: 5 intermediate values											
2025	5	1211813.14	S	78480	RDG	V	G0.03912.4	0.320T111	18CA		
gradual?: 4 intermediate values											
2025	5	1211820.03	S	78480	BDG	V	G0.04	22.4	0.440	112	18CA
blink: 5.5 intermediate values											
2025	5	1211826.92	S	78480	DDG	V	G0.14912.6		T112	18CA	
instantaneous: 1 intermediate values											
2025	5	1211827.16	S	78480	FDG	V	G0.04	22.6	0.400	112	18CA
flash: 5 intermediate values											
2025	5	1211830.17	S	78480	FDG	V	G0.04	12.7B0.080	112	18CA	
flash: 1 intermediate value											
2025	5	1211830.45	S	78480	FDG	V	G0.04	12.7	0.200	112	18CA
flash: 2.5 intermediate values											
2025	5	1211830.89	S	78480	RDG	V	G0.08112.7		T112	18CA	
instantaneous: 0 intermediate values											
2025	5	1211833.16	S	78480	DDG	V	G0.03713.1		T112	18CA	
instantaneous: 1 intermediate values											
2025	5	1211835.90	S	78480	RDG	V	G0.22813.1B0.320T111	18CA			
gradual?: 4 intermediate values											
2025	5	1211838.20	S	78480	BDG	V	G0.04	13.0	0.600	112	18CA
blink: 7.5 intermediate values											
2025	5	1211842.95	S	78480	DDG	V	G0.01812.7		T112	18CA	
instantaneous: 1 intermediate values											
2025	5	1211847.57	S	78480	RDG	V	G0.12412.7		34 T112	18CA	
instantaneous: 0 intermediate values											

Results
by
Mitsuru
Soma





Lessons learned

Dress rehearsal (Generalprobe):

Check systems and batteries beforehand, pack everything up.

Do not touch until travelling!

One box per system. Assign **each system a number**. Label all parts.

Timing:

Test **duration of each system setup** in real condition.

Be there on time, preferably during daylight hours.

Plan the sequence of activities just before and while recording **in advance**.

Nothing will be repeated! ;-)

Interpretability of light curve:

Increase gain only that the **dark edge of the moon** is barely visible.

Thank you
for
your
attention

