



Atelier API-Pro Am

ROADIES

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08 Novembre 2025

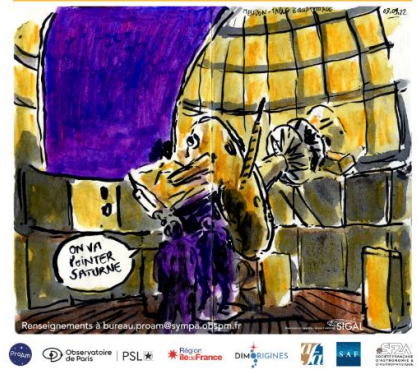
Contact : arnaudastro@gmail.com

**Journées de l'action incitative Pro-Am
de l'Observatoire de Paris - PSL**
pour favoriser les collaborations
entre les astronomes professionnels et amateurs

Vendredi 7 & samedi 8 novembre 2025
Observatoire de Paris - Campus de Meudon

Inscription gratuite mais obligatoire avant le 26 octobre
sur <https://geminiobspm.fr/>

- 7 novembre 10h-17h : présentations et résultats des projets Pro-Am soutenus
- 8 novembre 10h-17h : ateliers pratiques



Observatoire
de Paris

PSL



Région
Île-de-France



Réduire une courbe de lumière

Tangra V3.8

<http://www.hristopavlov.net/Tangra3/>

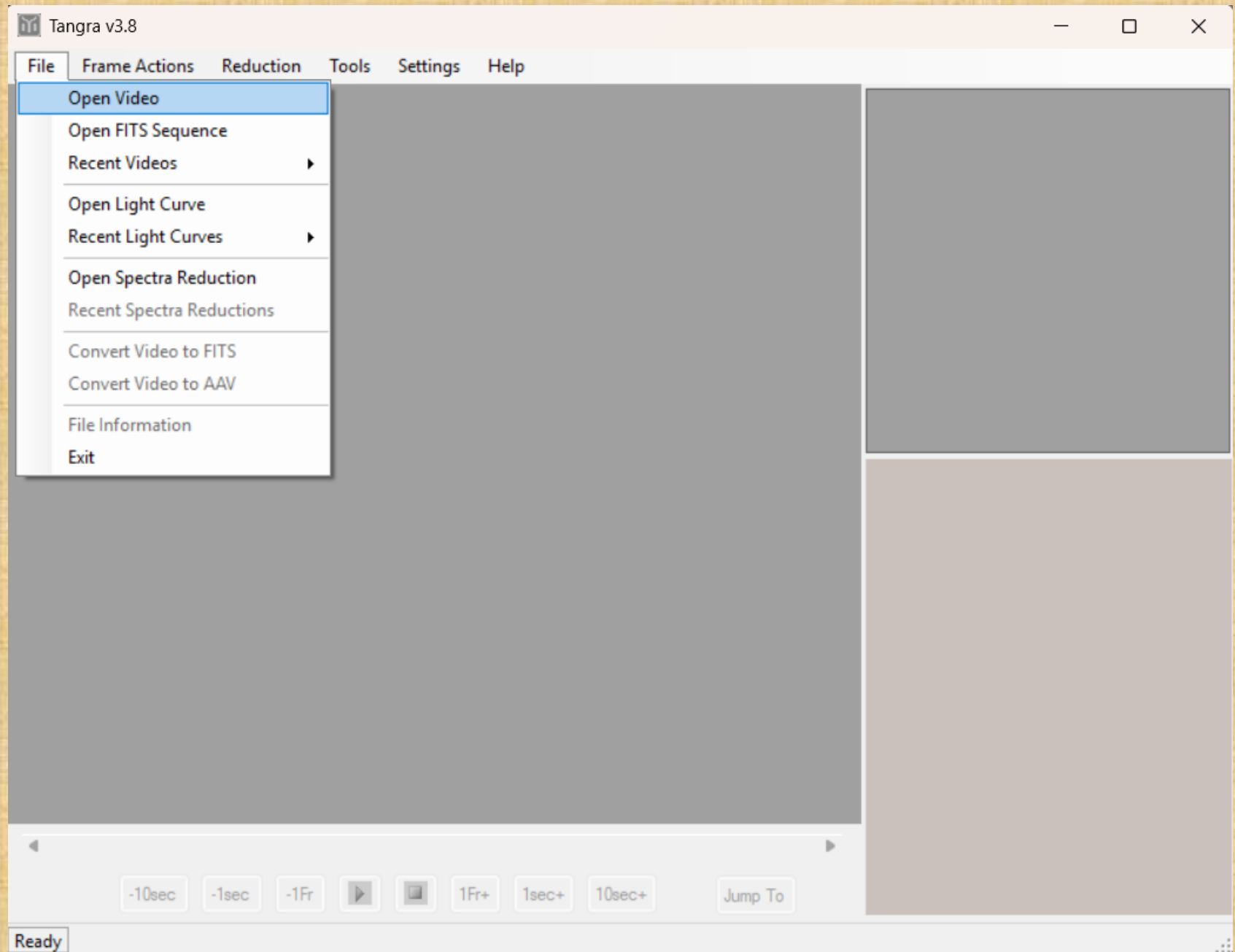
Formats de données acceptés : FITS,SER,ADV,AAV,AVI

Pymovie V4.1.5 :

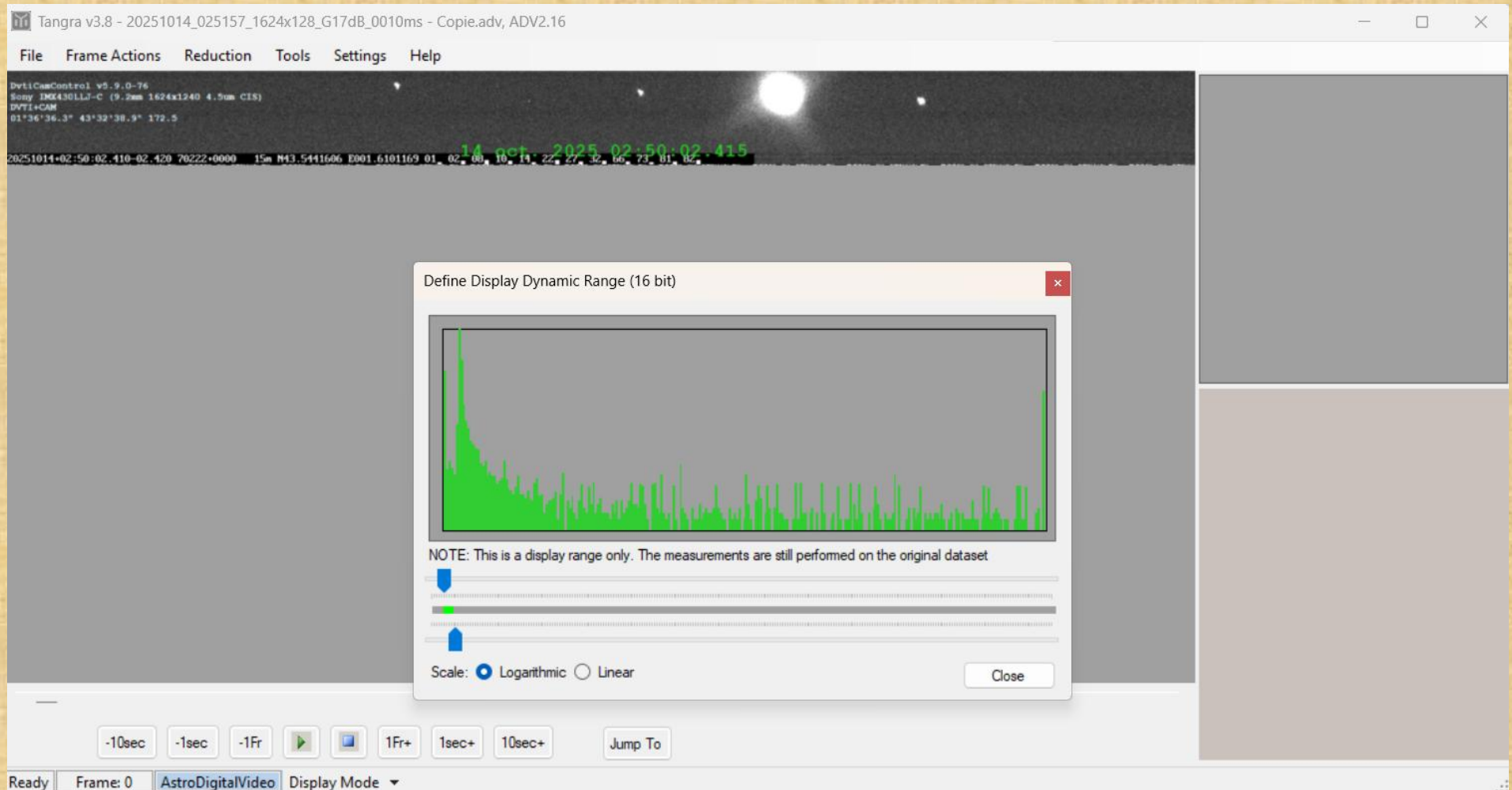
<https://occultations.org/observing/software/pymovie>

Formats de données acceptés : FITS,SER,ADV,AAV, AVI,MOV,
RAVF file

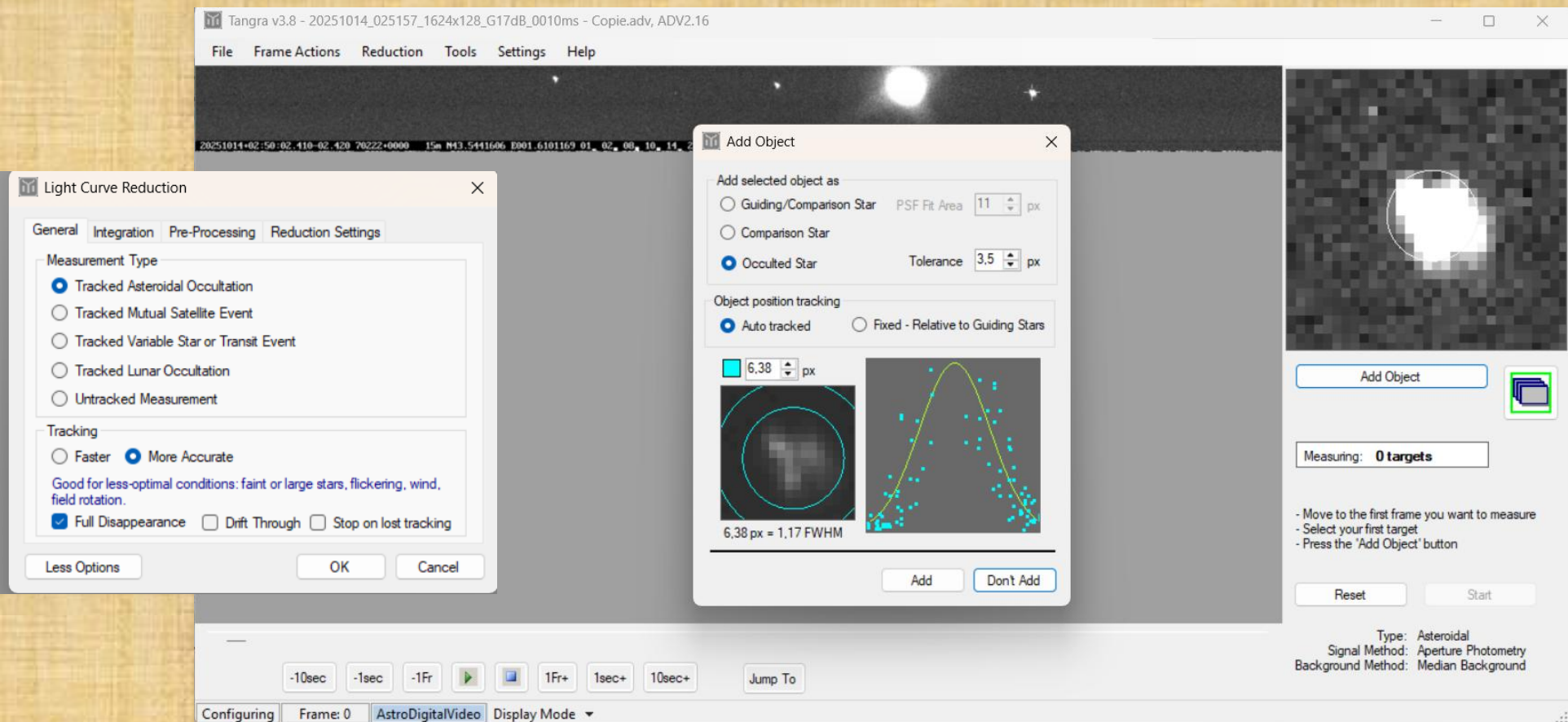
TANGRA v3.8



TANGRA v3.8



TANGRA v3.8



TANGRA v3.8

Tangra v3.8 - 20251014_025157_1624x128_G17dB_0010ms - Copie.adv, ADV2.16

File Frame Actions Reduction Tools Settings Help

20251014+02:50:02.810-02.820 70262+0000 15m M43.5441606 E901.6101169 01 02 00 10 22 27 32 66 01 02 03 14 14 oct. 2025 02:50:02.814

Add Object

Add selected object as

☒ Guiding/Comparison Star PSF Fit Area 11 px

☐ Occulted Star Tolerance 1.0 px

Object position tracking

☒ Auto tracked ☐ Fixed - Relative to Guiding Stars

6.38 px

6.38 px = 1.55 FWHM

Add Don't Add

Reset Start

Type: Asteroïdal
Signal Method: Aperture Photometry
Background Method: Median Background

Display: ☒ Brightness ☐ Pixels ☐ PSF

Tracking: Simplified Native

Processed Frames: 40

Unsuccessful: 0

Partially Successful: 1

Elapsed Time: 0:01

Continue

Finished Measurements

Manual Corrections

Sel: ☒ ☐ ☐

Obj: ALL 1 2

Skip This Frame Skip 10 Frames

-10sec -1sec -1Fr 1Fr+ 1sec+ 10sec+ Jump To

Stopped Frame: 40 AstroDigitalVideo Display Mode

TANGRA v3.8

Camera and Timing Corrections

Enter information about used video camera and timing

Camera/System DVTI <https://groups.io/g/d-vti-cam>

A digital video camera with or without integrated GPS receiver module.

Timestamping UTC Timestamp by the Camera

The camera has access to UTC, typically via a GPS receiver. It associates accurate time with the exposures and sends this with each frame as metadata or via the driver.

? OK

Camera and Timing Corrections

Enter information about used video camera and timing

Camera/System Other ARES M Pro Miralabe

Other camera not listed above with or without integrated GPS receiver.

Timestamping Windows Timestamp by Recording Software

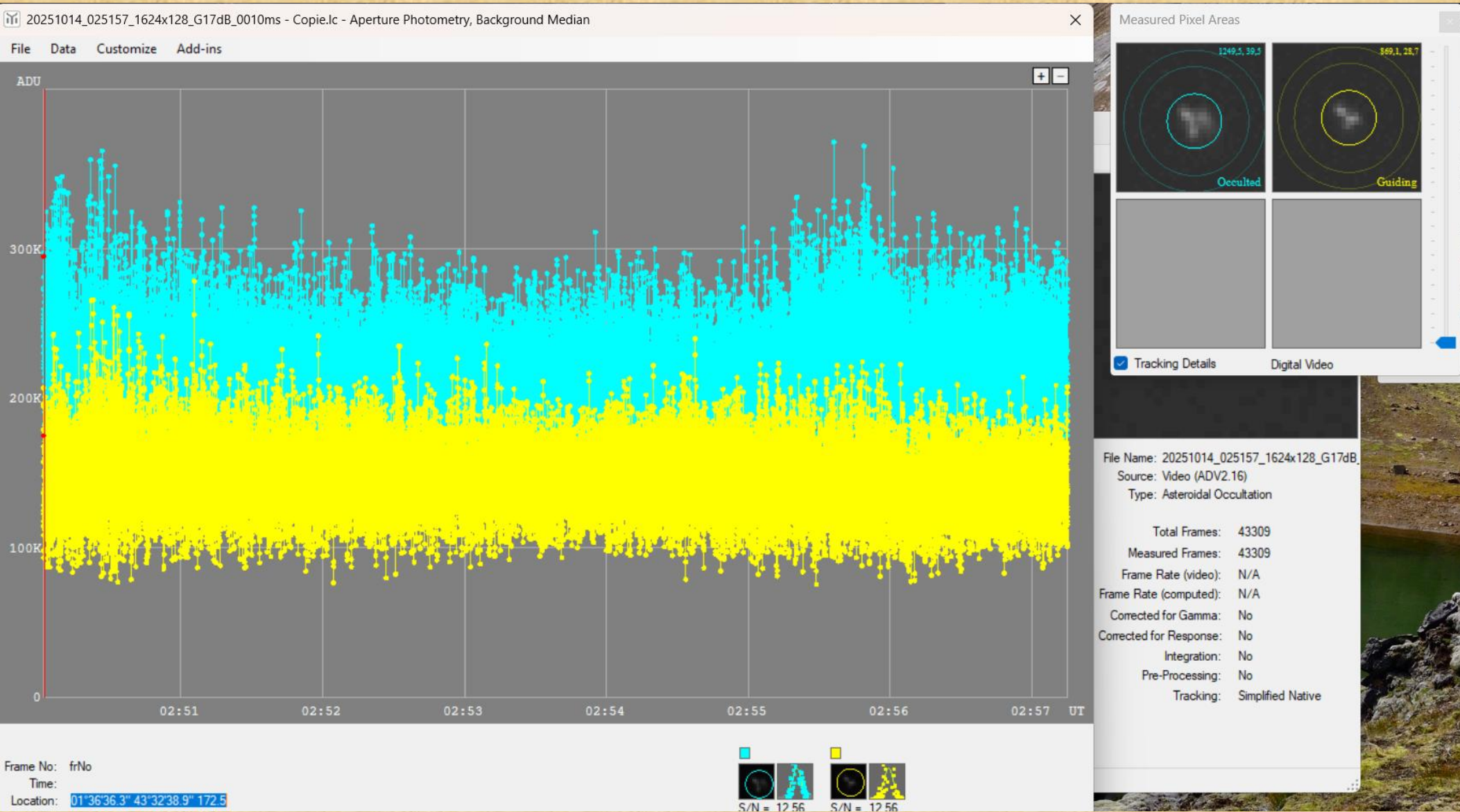
The Windows Clock may be synchronised to UTC by external source or device such as GPS or an NTP Server. The recording software is using the Windows Clock to timestamp the recorded frames as they are received.

Acquisition Delay 0 milliseconds Help

☐ (Reference Time - UTC) Offset milliseconds Help

? OK

TANGRA v3.8



Pymovie v4.1.5

PyMovie Version: 4.1.5

Version Info File: 00_09_58Z/2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259_1.fits

Save aperture group Restore aperture group Examine/change aperture settings 41 Select aperture size

Threshold spinner increments: 1 10 100

Set mask threshold (mskth) counts above background (bkavg) 0

☐ View avi fields
☐ Process avi in field mode
☒ top field is first in time
☐ bottom field is first in time

☒ Show image contrast control
☐ Make contrast setting "sticky"
4096 sat. pixel value
Plot Robust Mean

File/Folder Timestamp CCD tools Dark/Flat "finder" Image/Plot WCS Help Pref. Median/Misc CMOS tools

Open AVI/MOV/SER/ADV/AAV/RAVF file
Create AVI/MOV/SER/ADV/AAV/RAVF-WCS folder from file
Select AVI/MOV/SER/ADV/AAV/RAVF-WCS folder
Select FITS folder
Show FITS/SER/ADV/AAV/RAVF file metadata
☐ Display frame metadata for ADV/AAV/RAVF frames
Open "finder" image

2025 05 31 00:09:58.6857554 Z

60000
50000
40000
30000
20000
10000
0
-10000

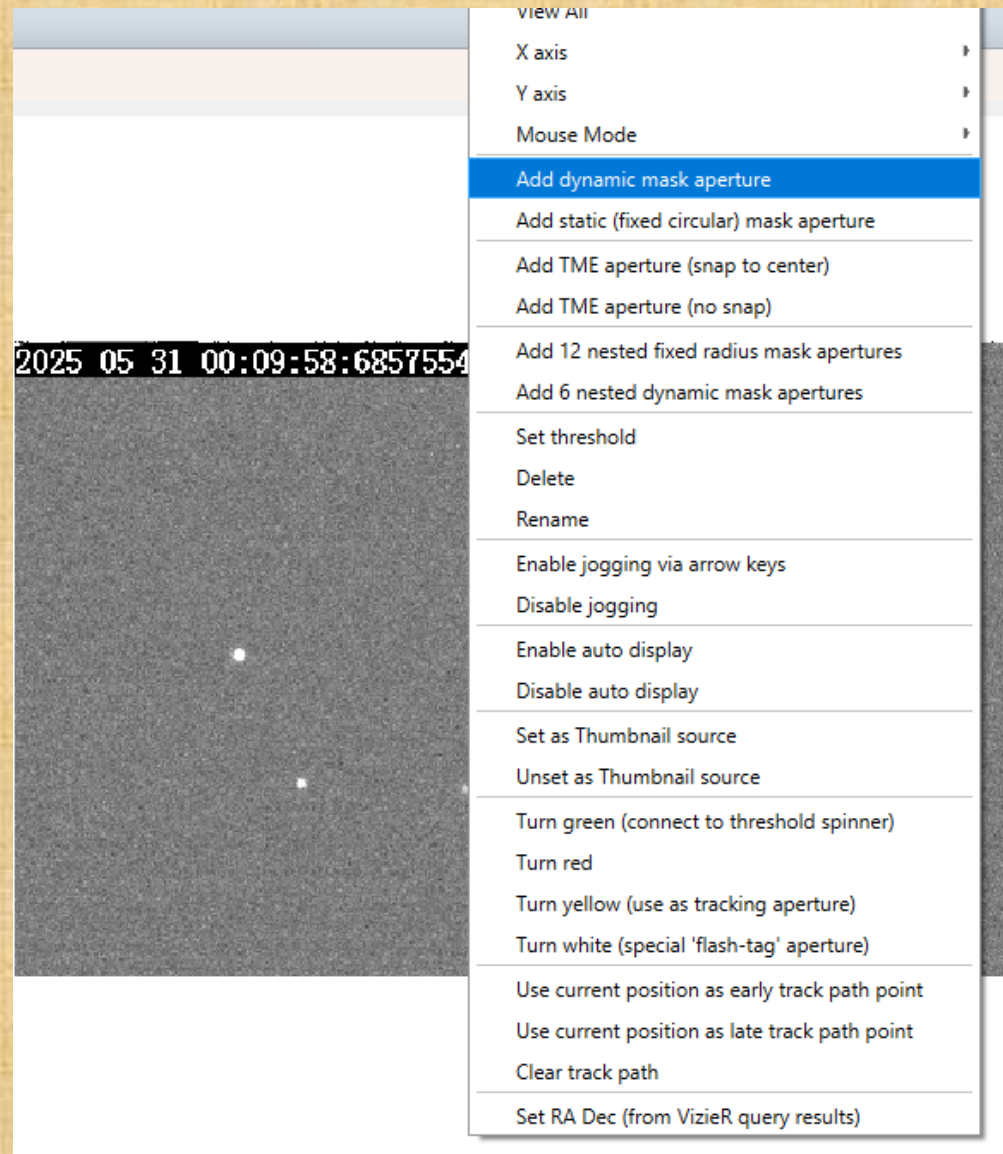
PyMovie Version: 4.1.5
Home directory: C:\Users\arnau\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\LocalCache\local-packages\Python310\site-packages\pymovie
Opened FITS folder: E:\Sharcap Captures\2025-05-31\2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259\00_09_58Z
... and found 1193 files of the form: 2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259_1.fits
Timestamp found: 2025-05-31 @ 00:09:58.6857554
image shape: width=480 height=300
No target star location found in the folder.
New scaling levels: black=0.0 white=128.0

Apply corr << < 200 frames < 25 frames -1 fr < analyze pause > +1 fr > 25 frames > 200 frames > >>
auto-run PyOTE write csv plot current frame: 0 E 1192 :stop frame mark Back to 'mark' clear data

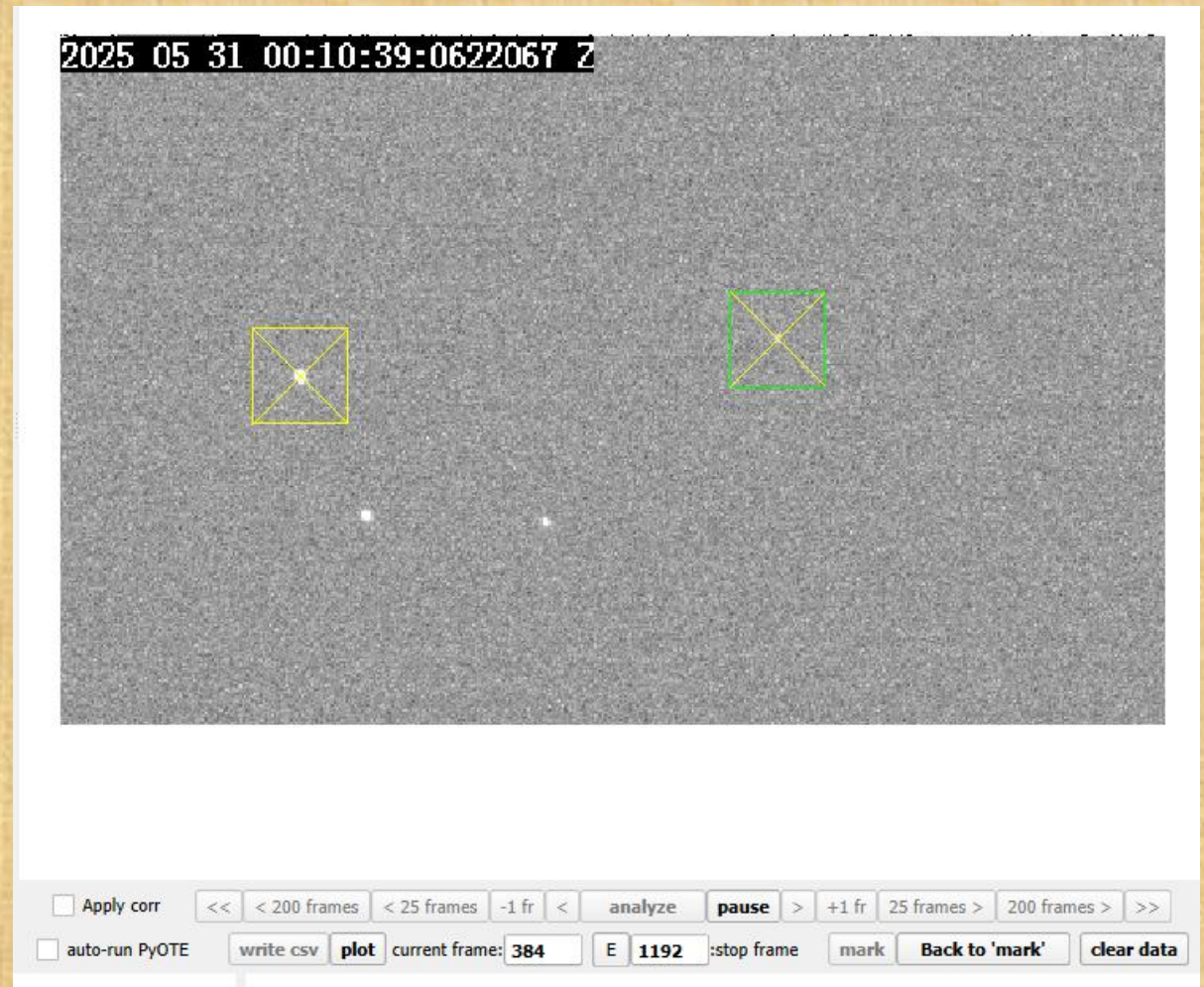
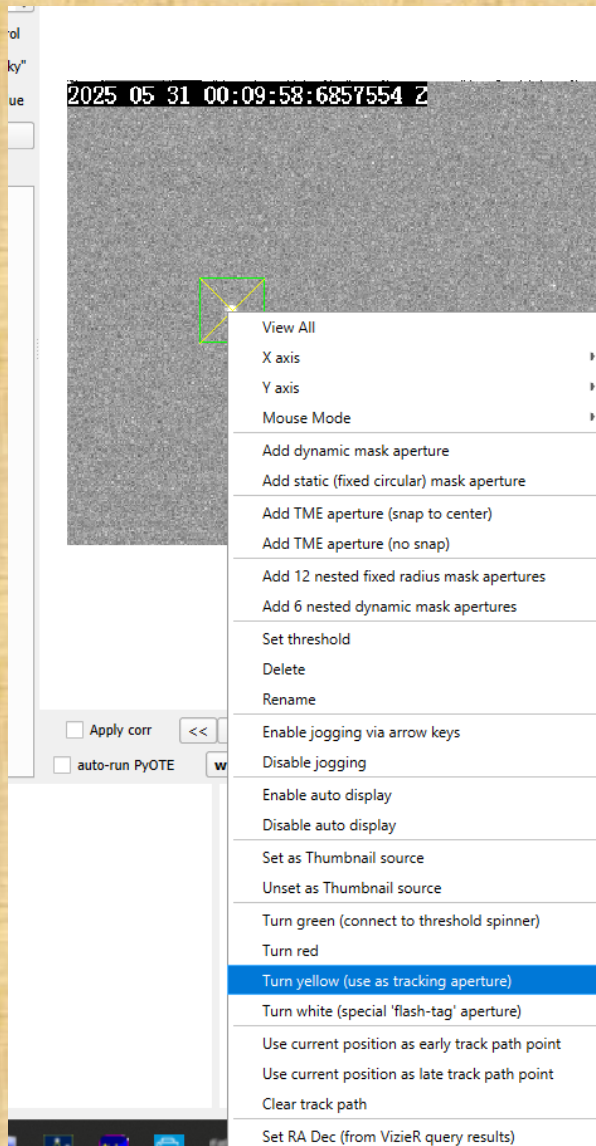
Right-click here for info
Thumbnail Two (right-click here for info)

x=6 y=3 intensity=0

Pymovie v4.1.5

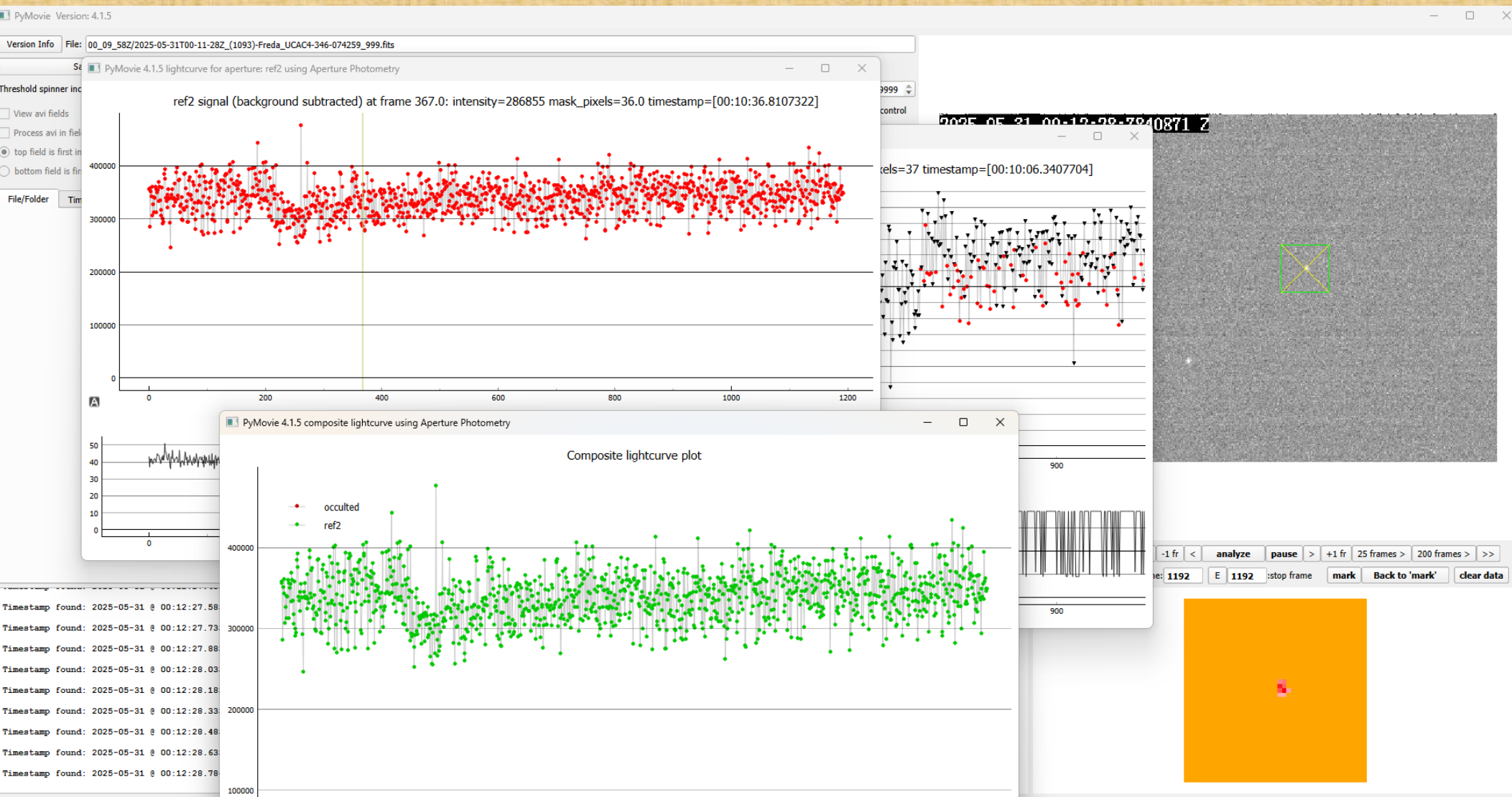


Pymovie v4.1.5



☐ Apply corr << < 200 frames > 200 frames >>

☐ auto-run PyOTE **write csv** **plot** cu



Extraire les temps D et R – AOTA (occult 4)



AOTA (occult 4)

Integrity check: E:\SharCap Captures\2025-05-31\2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259\00_09_58Z.lc

OCR of Time Stamps... Help

Double-click in column to set a frame Invalid, to Add one or more frames IMMEDIATELY before, or to Delete that frame.

Return to analysis (Exit)

Variation in the interval between frames = 0.000 secs

Plot of light curve, folded at multiples of 2^x. Integration changes should align

Check Times
Check Measures

Clear all checks

Frame	UTC at start	Invalid	Add	Delete
1	0 9 58.686			
2	0 9 58.836			
3	0 9 58.986			
4	0 9 59.136			
5	0 9 59.286			
6	0 9 59.436			
7	0 9 59.586			
8	0 9 59.736			
9	0 9 59.886			
10	0 10 0.036			
11	0 10 0.187			
12	0 10 0.337			
13	0 10 0.487			
14	0 10 0.637			
15	0 10 0.787			
16	0 10 0.937			
17	0 10 1.087			

Possible missed images

Times
794
858

Set all
Clear all

Possible duplicated images

Times
Measures

Set all
Clear all

Set all
Clear all

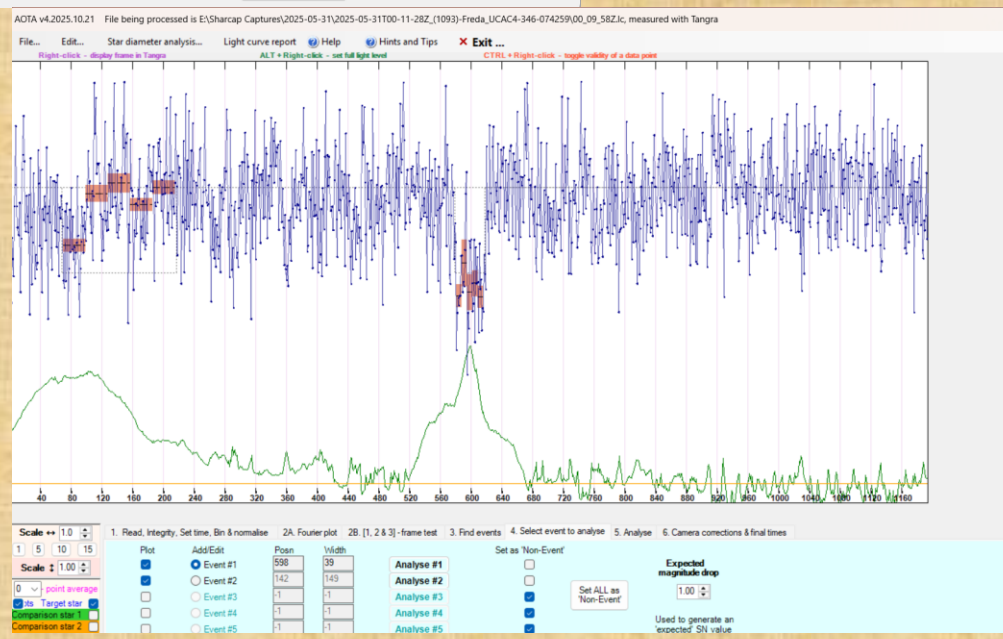
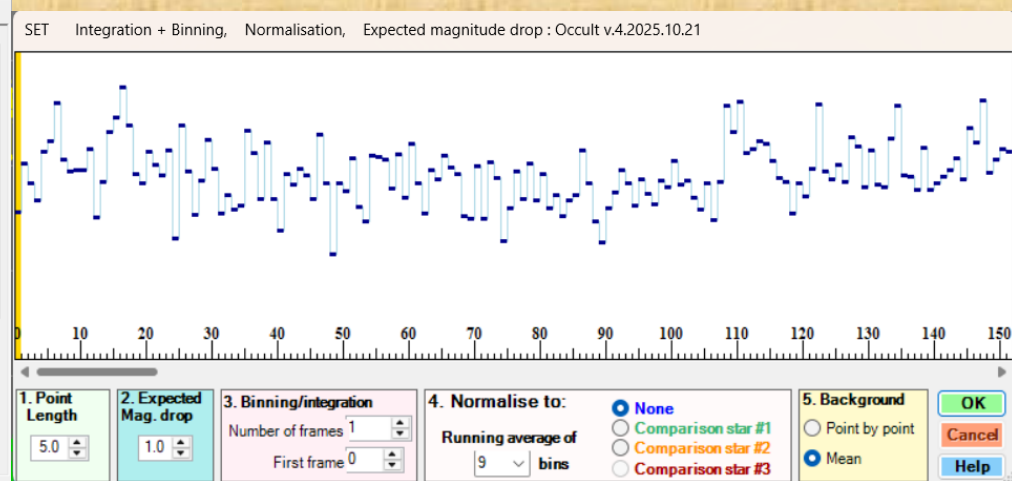
Insert/Delete images
- and re-load

Frame ID
Hr
Min
Sec
58.686

Display secs to 4 decimal places

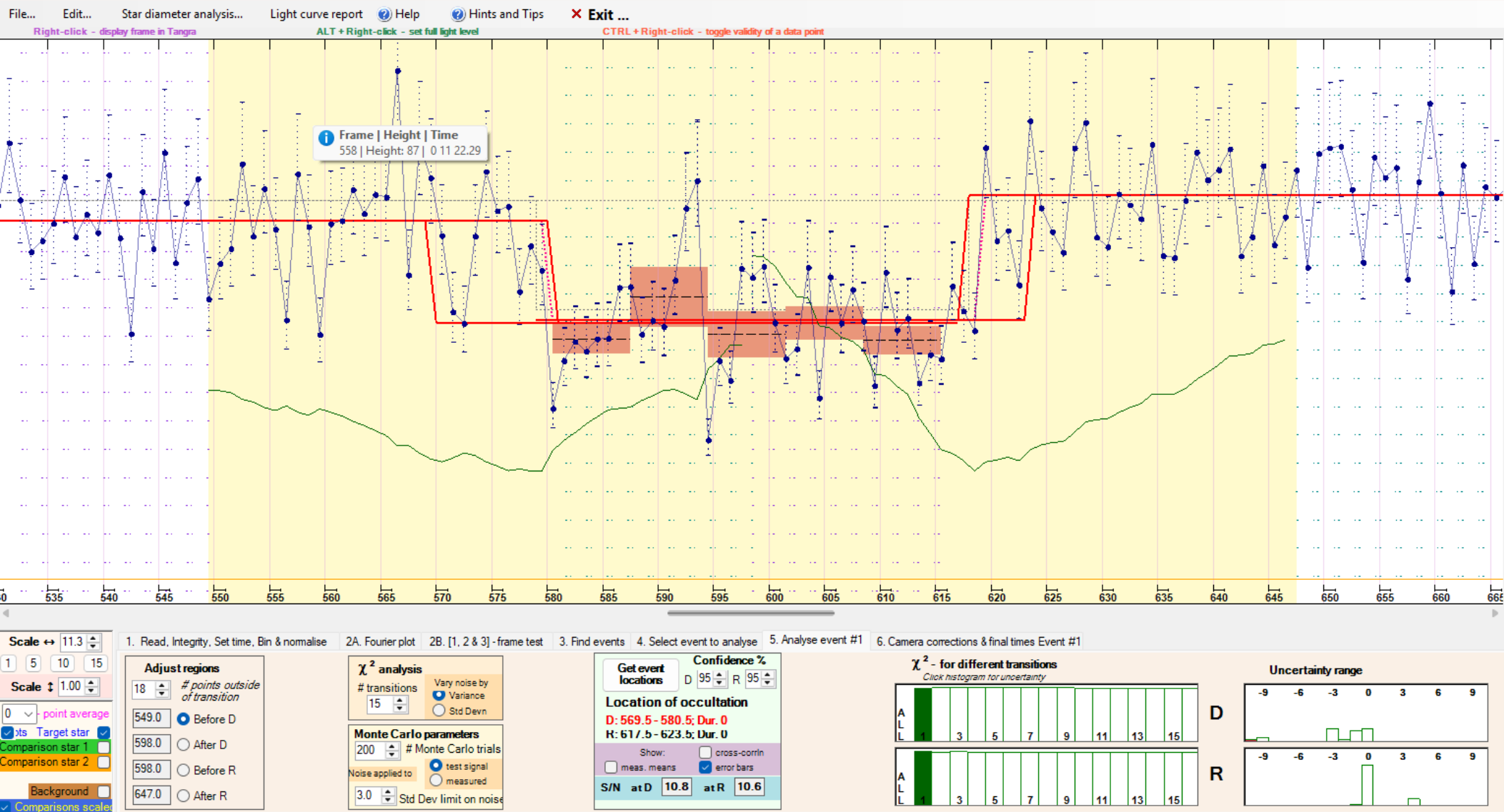
Set this time for the selected frame

OCR progress



AOTA (occult 4)

AOTA v4.2025.10.21 File being processed is E:\Sharcap Captures\2025-05-31\2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259\00_09_58Z.lc, measured with Tangra

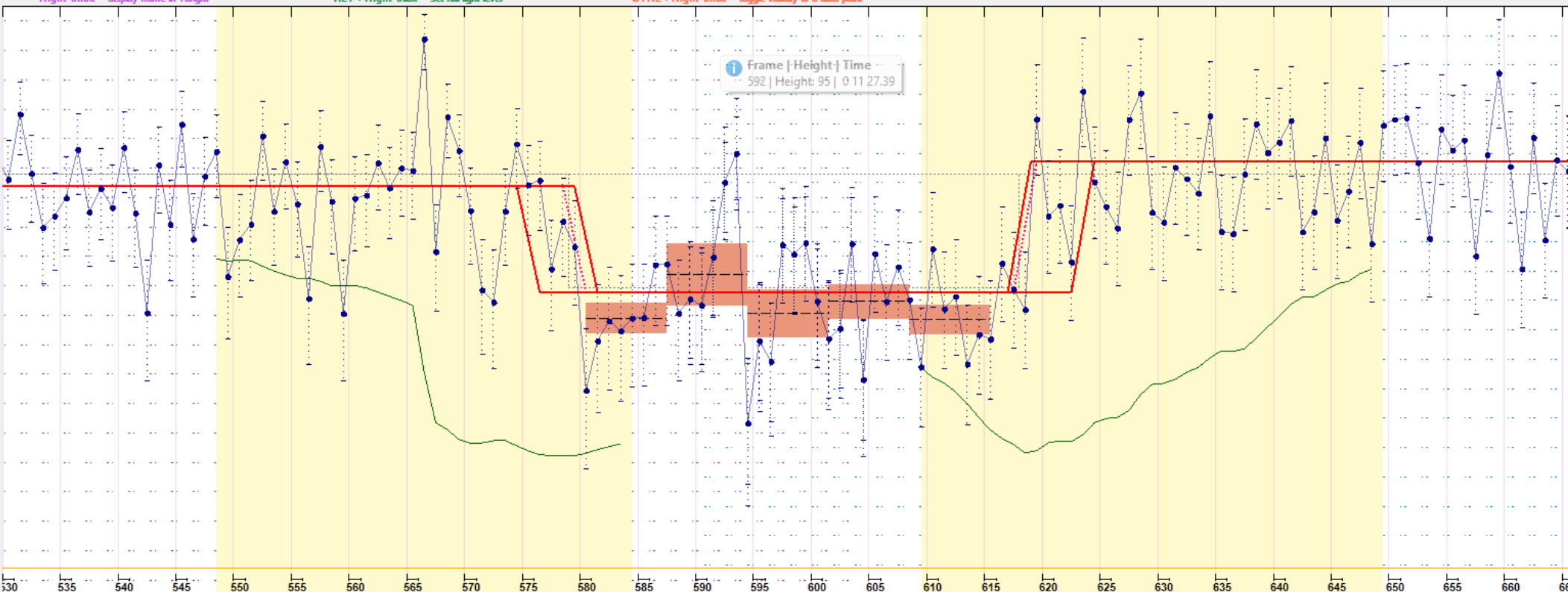


AOTA (occult 4)

AOTA v4.2025.10.21 File being processed is E:\Sharcap Captures\2025-05-31\2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259\00_09_58Z.lc, measured with Tangra

File... Edit... Star diameter analysis... Light curve report Help Hints and Tips Exit ...

Right-click - display frame in Tangra ALT + Right-click - set full light level CTRL + Right-click - toggle validity of a data point



Scale 11.3 1 5 10 15 Scale 1.00 0 point average Comparison star 1 Comparison star 2 Background Comparisons scale

1. Read, Integrity, Set time, Bin & normalise

2A. Fourier plot 2B. [1, 2 & 3] -frame test

3. Find events 4. Select event to analyse

5. Analyse event #1

6. Camera corrections & final times Event #1

Adjust regions

20 # points outside of transition

548.0 ☐ Before D

584.0 ☐ After D

609.0 ☐ Before R

649.0 ☒ After R

χ^2 analysis

transitions 10

Vary noise by ☒ Variance ☐ Std Devn

Monte Carlo parameters

200 # Monte Carlo trials

Noise applied to ☒ test signal ☐ measured

3.0 Std Dev limit on noise

Get event locations

D 95 R 95

Confidence %

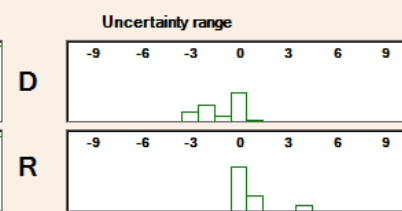
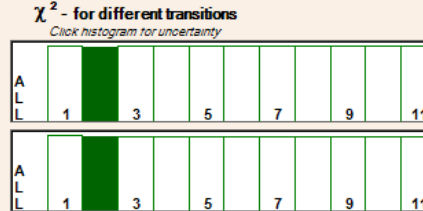
Location of occultation

D: 575.5 - 580.5; Dur. 1

R: 618.0 - 623.5; Dur. 1

Show: ☐ meas. means ☒ cross-corrin ☒ error bars

S/N at D 2.1 at R 2.3



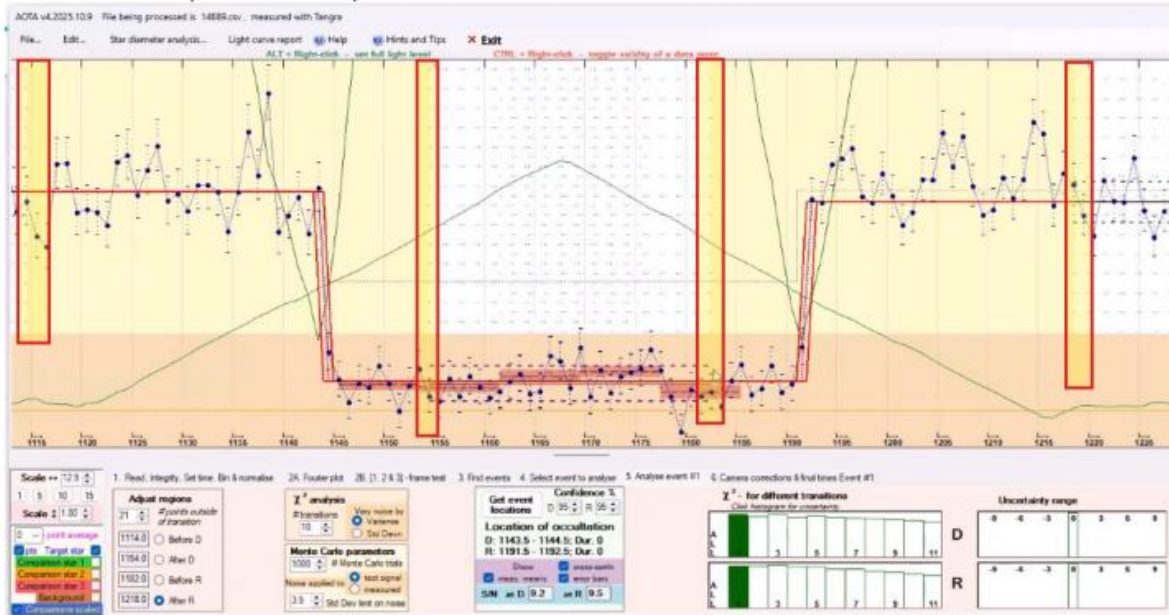
AOTA (occult 4)

SODIS

Tuto OCCULT4 – PyMovie - PyOTE pour revue des rapports d'occultation – V6

26/10/2025

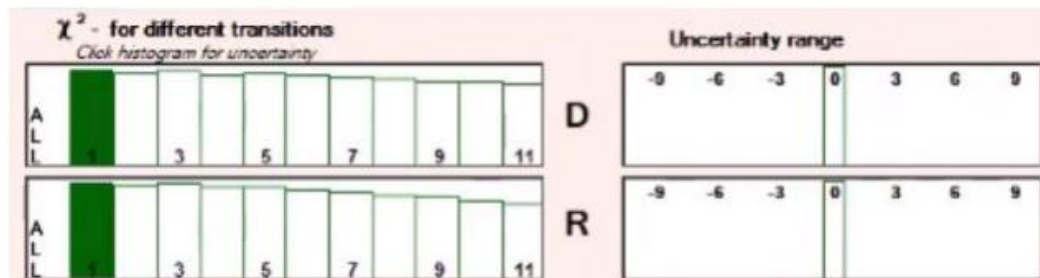
Resélectionner les points avant et après transitions d'entrée et de sortie d'occultation



Get event locations

Puis cliquer sur le bouton

Le but est d'obtenir ce genre de graphe propre avec une incertitude la plus faible possible :



Pyote 5.7.11

PyOTE Version: 5.7.11

Info Help Tutorial Read light curve Help for plot -->

Lightcurves SqWave model VizieR export Other models Manual timestamps Settings/Misc. Noise analysis/|

SqWave model help

Manual/automatic block integrate Block size

Accept auto block integration

Trim left/right

Validate a potential single point event

Optional: enter the expected magDrop for the event to get a visual of how that event level matches your observation.

When edges are clearly visible, mark points to specify region and click ...

Mark D region Mark R region mark Event points to use

... otherwise use the entries below to place bounds on the event size.

min event: max event:

Finally, click on Find event

Find event Clear fit metrics fit metrics -> .xlsx

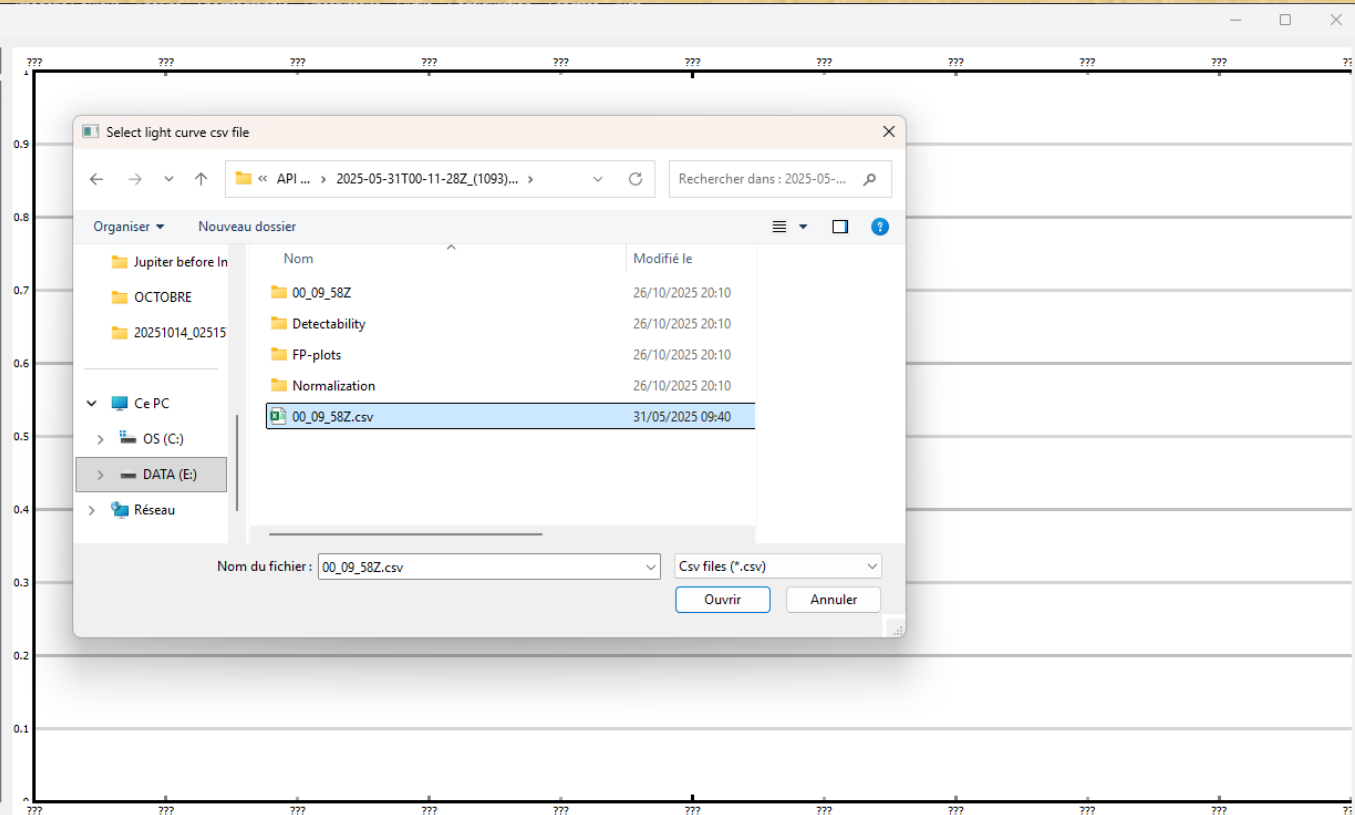
0% Cancel

Write current plot Write error bar plot Save current light curve to .csv ... fill Excel report

Start over

Right-click this label to get explanation of data grid below:

	FrameNum	timeInfo	LC1	LC2	LC3	LC4
1						
2						
3						



Pyote 5.7.11

PyOTE Version: 5.7.11 File being processed: E:/API Pro Am exo/2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259/00_09_58Z.csv

Info Help Tutorial Read light curve Help for plot -->

Lightcurves SqWave model VizieR export Other models Manual timestamps Settings/Misc. Noise analysis/1

Lightcurves tab help

target ref show Y offset step size: 10 100 1000

☒	☐	☒	LC1	Y offset: 0	X offset: 0
☐	☐	☐	LC2	Y offset: 0	X offset: 0
☐	☒	☒	LC3	Y offset: 0	X offset: 0
☐	☐	☐		Y offset: 0	X offset: 0
☐	☐	☐		Y offset: 0	X offset: 0
☐	☐	☐		Y offset: 0	X offset: 0
☐	☐	☐		Y offset: 0	X offset: 0
☐	☐	☐		Y offset: 0	X offset: 0
☐	☐	☐		Y offset: 0	X offset: 0
☐	☐	☐		Y offset: 0	X offset: 0

Add lightcurve Clear lightcurve list

smoothing readings 2 Set step: 2 10 100 Mark metric points Clear metric points

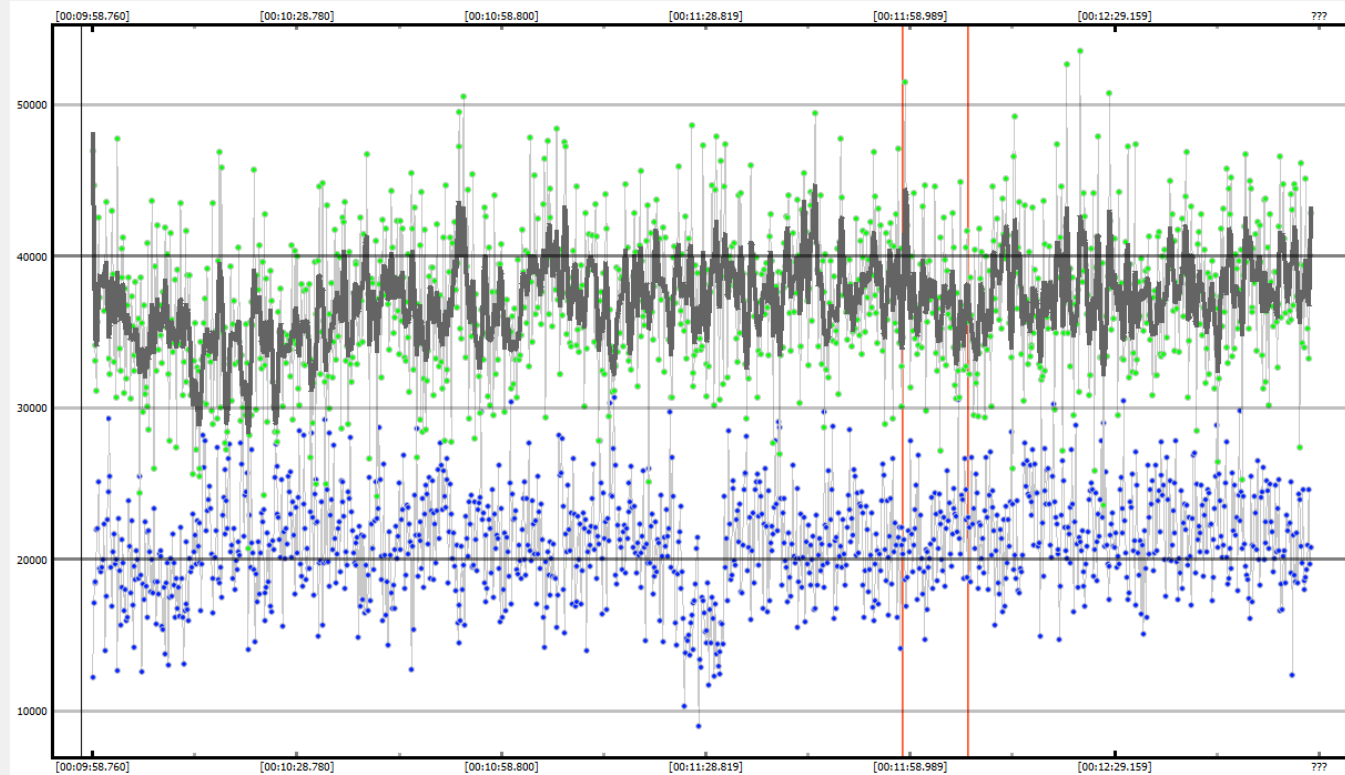
Mark baseline region

Calc baseline mean/sigma/corr coeffs

Clear baseline regions

Find event

0%



Right-click this label to get explanation of data grid below:

	FrameNum	timeInfo	LC1	LC2	LC3	LC4
0	1	[00:09:58.760]	12194.0	118720	46910.0	
1	2	[00:09:58.910]	17092.3	135670	44680.0	
2	3	[00:09:59.060]	18428.6	134230	34140.0	
3	4	[00:09:59.211]	18487.0	136590	33090.0	
4	5	[00:09:59.361]	21969.9	145970	31100.0	
5	6	[00:09:59.511]	22054.1	125340	35610.0	
6	7	[00:09:59.661]	25086.6	136180	42540.0	

At reading 00792: time delta to next reading = 0.3000 : likely 1 dropped readings
At reading 00856: time delta to next reading = 0.3000 : likely 1 dropped readings

===== Total dropped readings..... 2
===== Num duplicated readings..... 0
===== Number timestamp errors..... 0
===== Number of cadence errors..... 2

timeDelta: 0.150099 seconds per reading
timestamp error rate: 0.168%

LC3 is selected as the reference curve for normalisation.

LC1 is the target curve.

LC1 is the target curve.

Flatness (minimize this value): 3402.14 (readings: 2) (X offset: 0)

Pyote 5.7.11

PyOTE Version: 5.7.11 File being processed: E:/API Pro Am exo/2025-05-31T00-11-28Z_(1093)-Freda_UCAC4-346-074259/00_09_58Z.csv

Info Help Tutorial Read light curve Help for plot -->

Lightcurves SqWave model VizieR export Other models Manual timestamps Settings/Misc. Noise analysis/1

SqWave model help

Manual/automatic block integrate ☐ Block size

Accept auto block integration

Trim left/right

Validate a potential single point event

Optional: enter the expected magDrop for the event to get a visual of how that event level matches your observation. ☐

When edges are clearly visible, mark points to specify region and click ...

Mark D region Mark R region mark Event points to use

... otherwise use the entries below to place bounds on the event size.

min event: max event:

Finally, click on Find event

Find event Clear fit metrics fit metrics -> .xlsx

0% Cancel

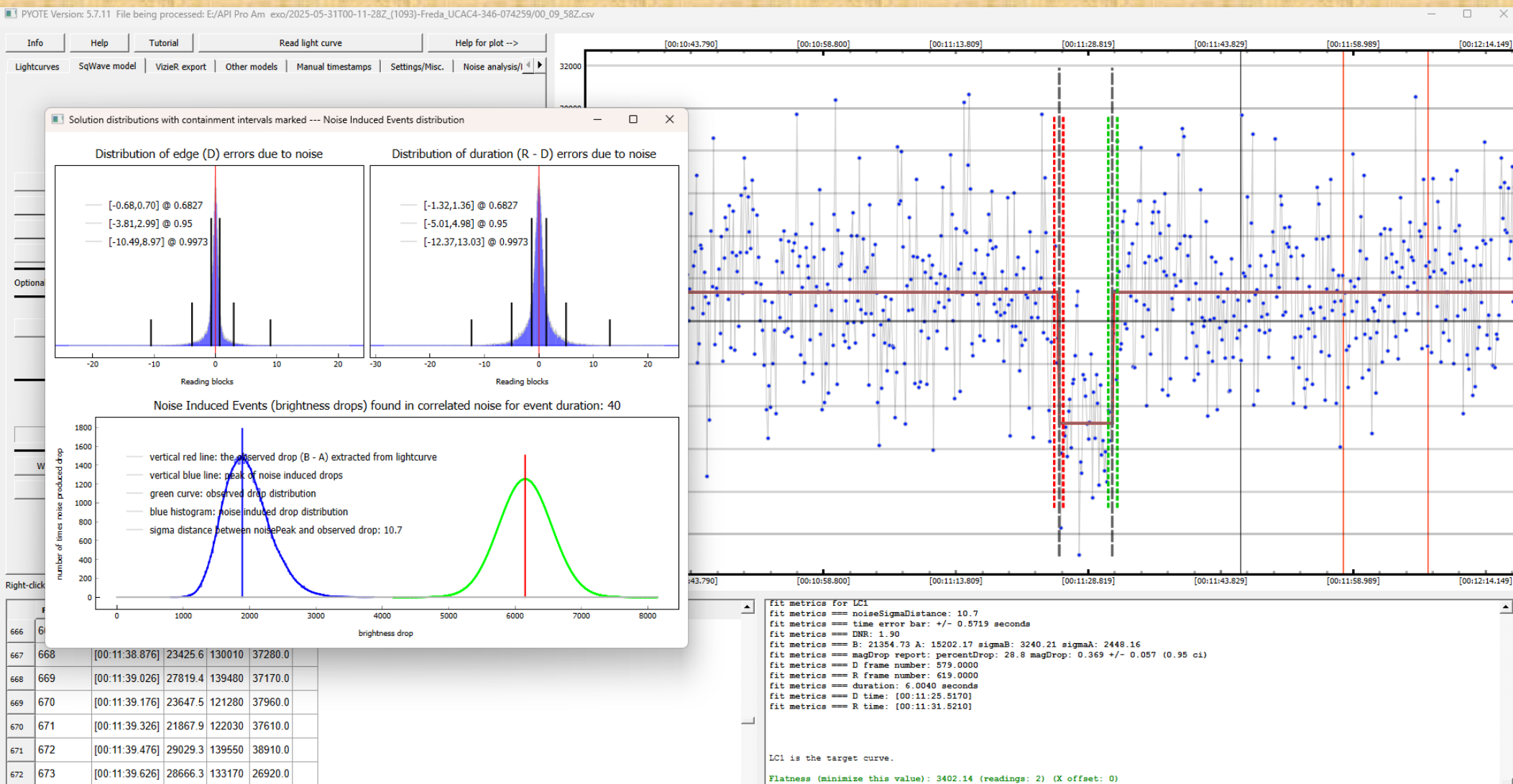
Write current plot Write error bar plot Save current light curve to .csv ... fill Excel report

Start over



Right-click this label to get explanation of data grid below:

Pyote 5.7.11



A wooden easel with three legs holds a rectangular sign. The sign is light-colored with a slightly textured appearance. The text on the sign is written in a black, elegant cursive font. The background is split horizontally into a light green upper half and a light blue lower half, with a soft shadow cast by the easel onto the blue surface.

Thank you
for your
attention