

UFO Analyser - Leeds

Overview

Processes video clips recorded by *UFO Capture*

Profile – stellar scintillation masks against SKY 2000 catalogue

Derives meteor characteristics:

- Apparent magnitude

- Duration

- Start and end points of trail

- Angular velocity

- Shower membership (provisional)

- Distance from catalogue radiant

- Orbital velocity

Creates M?.csv file for use in *UFO Orbit*

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Stellar registration profile

Registers the video stellar scintillation masks with SKY 2000

Unique to each camera / lens combination

Must be recreated if:

Either is moved or changed

Brightness / contrast are changed

Analyser can compensate for small displacements:

Flexure of camera / lens / mounting

Subsidence

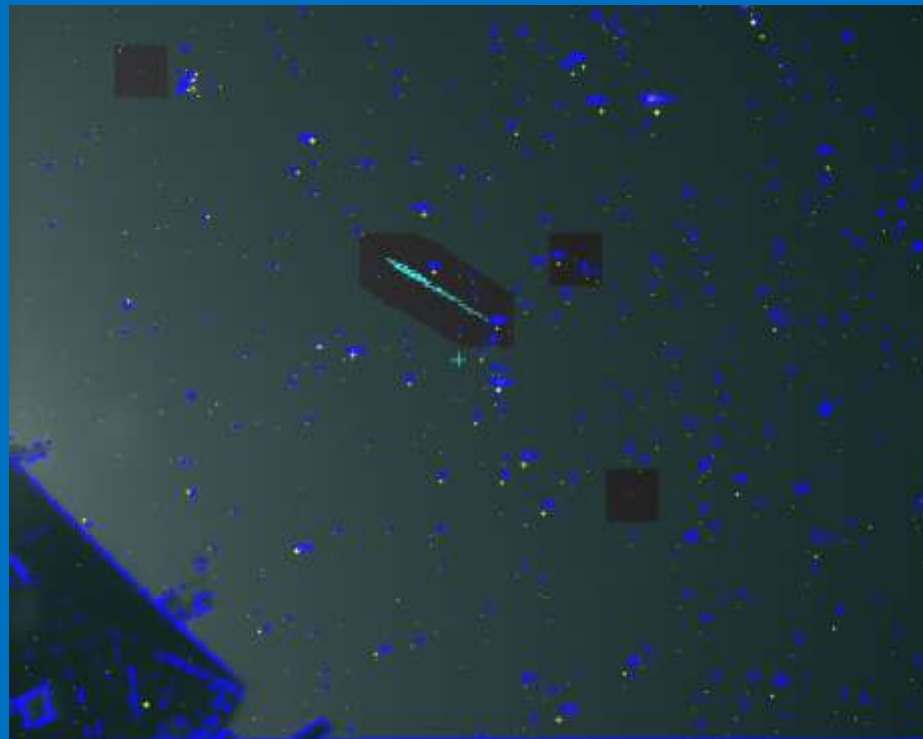
Change of focus

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Stellar registration profile

Profile check

View		Mask Editor		Trail Map		Ground Map			
prev	edit	<input type="radio"/> dot	<input type="radio"/> opt-mask	<input type="radio"/> size1	2	<input type="checkbox"/> mgl	<input checked="" type="checkbox"/> r		
next	auto	<input checked="" type="radio"/> line	<input type="radio"/> area-mask	<input type="radio"/> size2	4	<input checked="" type="checkbox"/> lin	5.0		
link	fill	<input type="radio"/> rect	<input type="radio"/> scl-mask	<input type="radio"/> size3	16	qm	smag		
		<input checked="" type="radio"/> d-area	<input checked="" type="radio"/> d-area				del		
							saveN	save	x 0576 y 0054
							reload	x1	az 330.5567 ev 47.8931
									ra 030.2217 dc 70.5842



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Stellar registration profile

For each batch of video clips

Use a master profile

Read in the clips

Mask Editor – link – auto link – adj pos all

Click <SD to remove poor links until $\text{dpix avr} \leq 0.3$

Tick 'mg' box to review magnitude fit

Rerun adj pos all

If necessary, click <SD

Click 'mag' to compute the linear fit

Re-read the clips

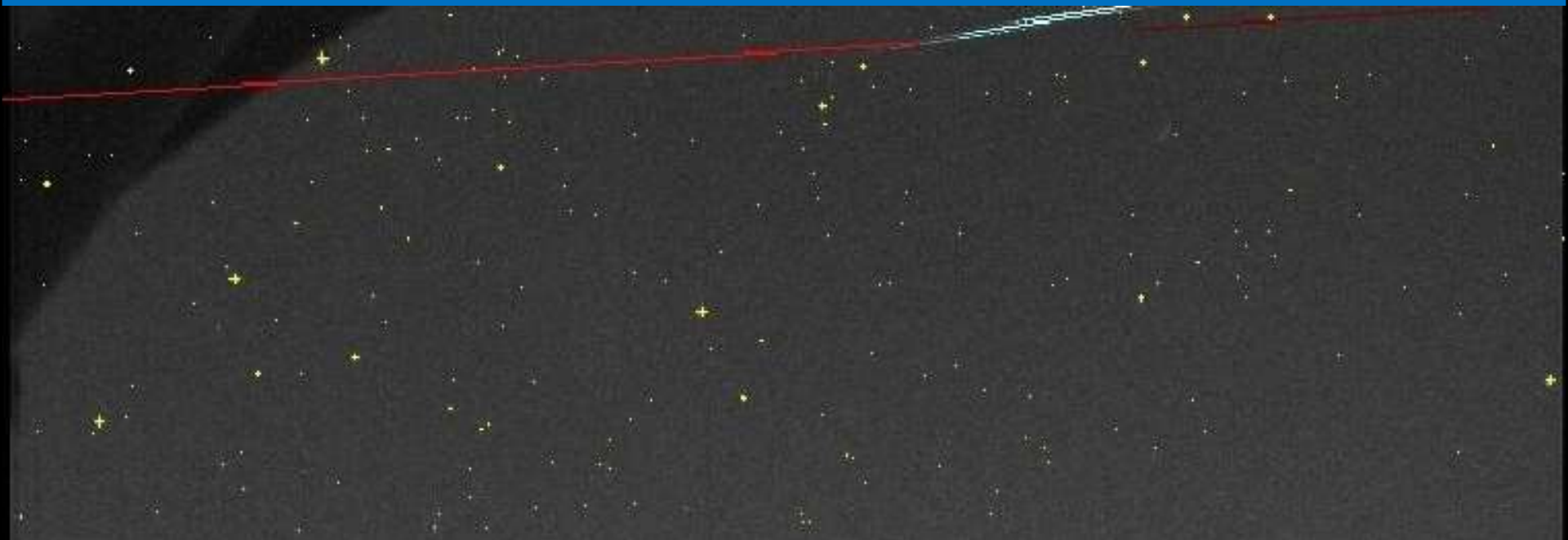
Run analyze all

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Checking trail alignment

Do an *Analyze All* pass as a first run through

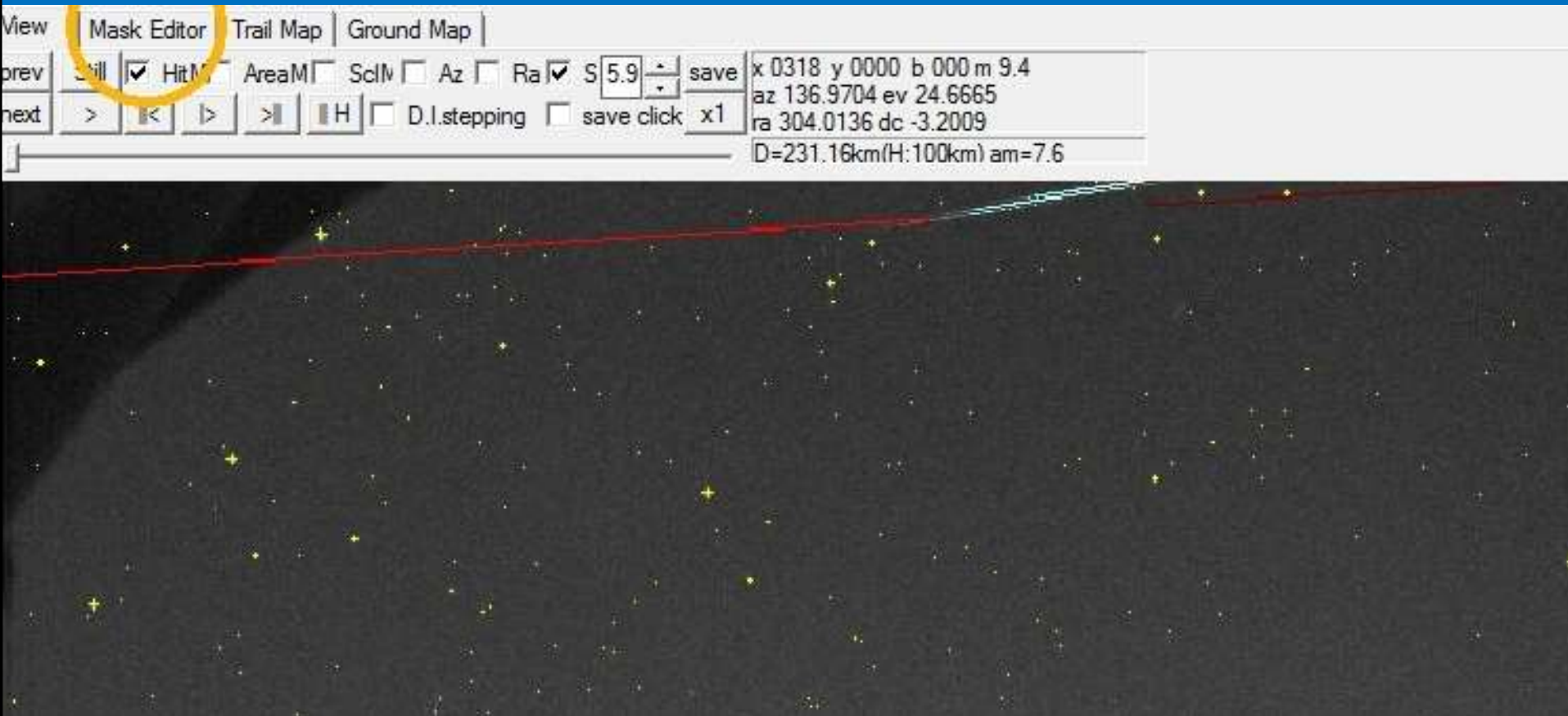
Analyser isn't perfect, so do a manual check of each capture



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Checking trail alignment

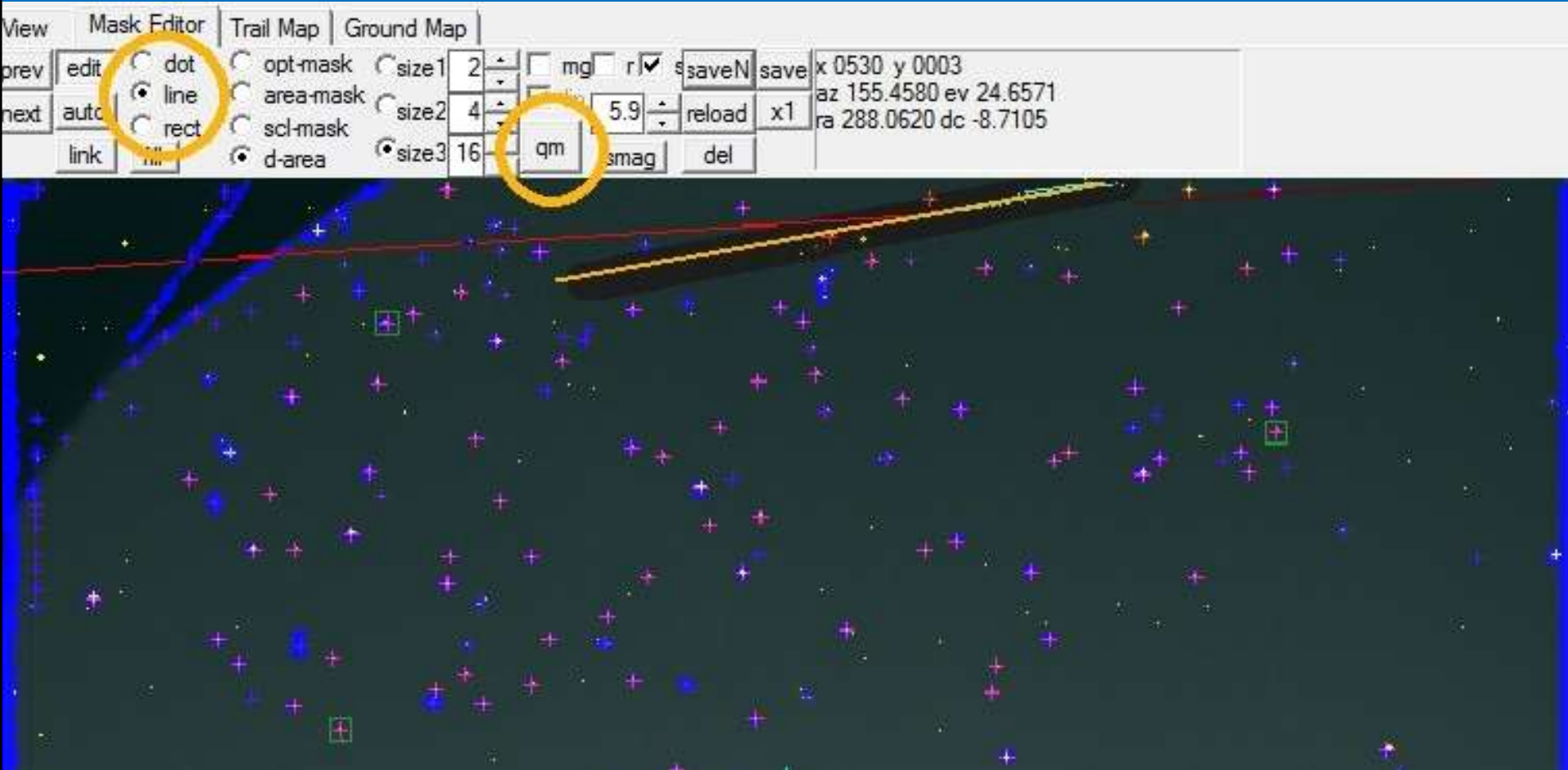
Use Mask Editor to correct the alignment



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Checking trail alignment

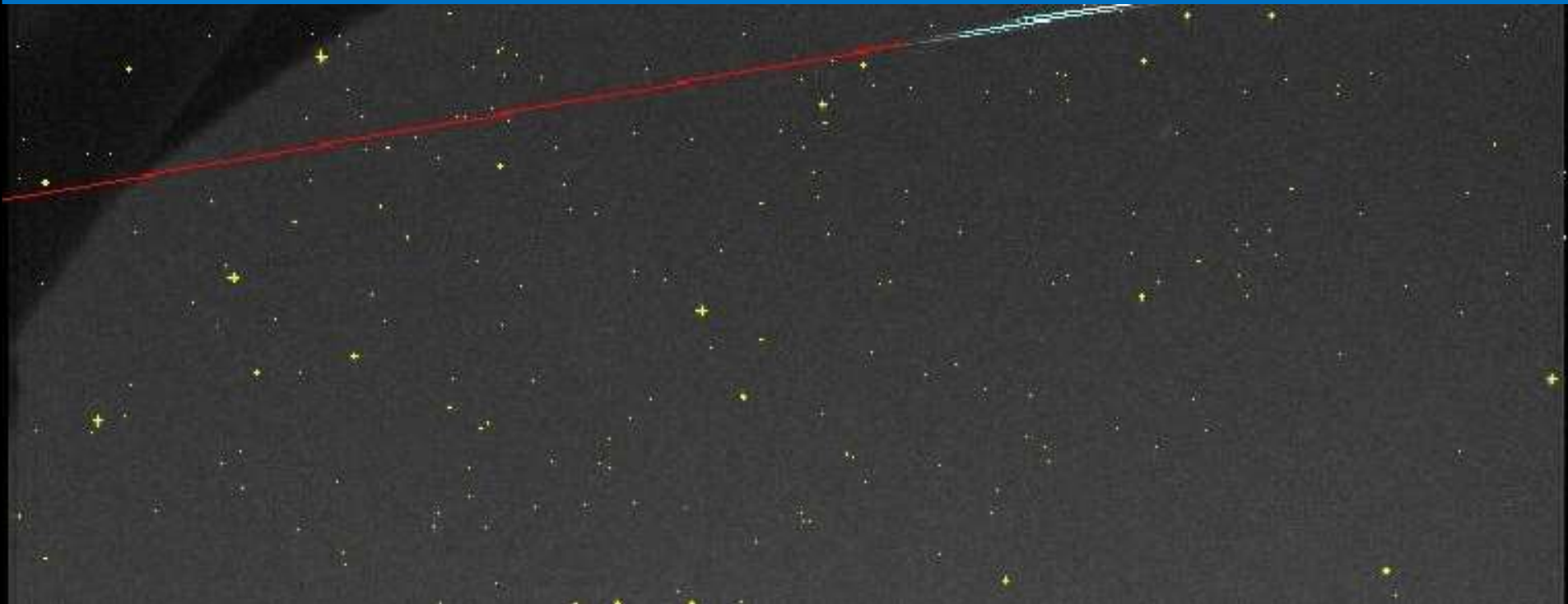
Use Mask Editor - 'qm' (Quick Mask) and 'line' option
Click on 'A' to re-analyse the clip



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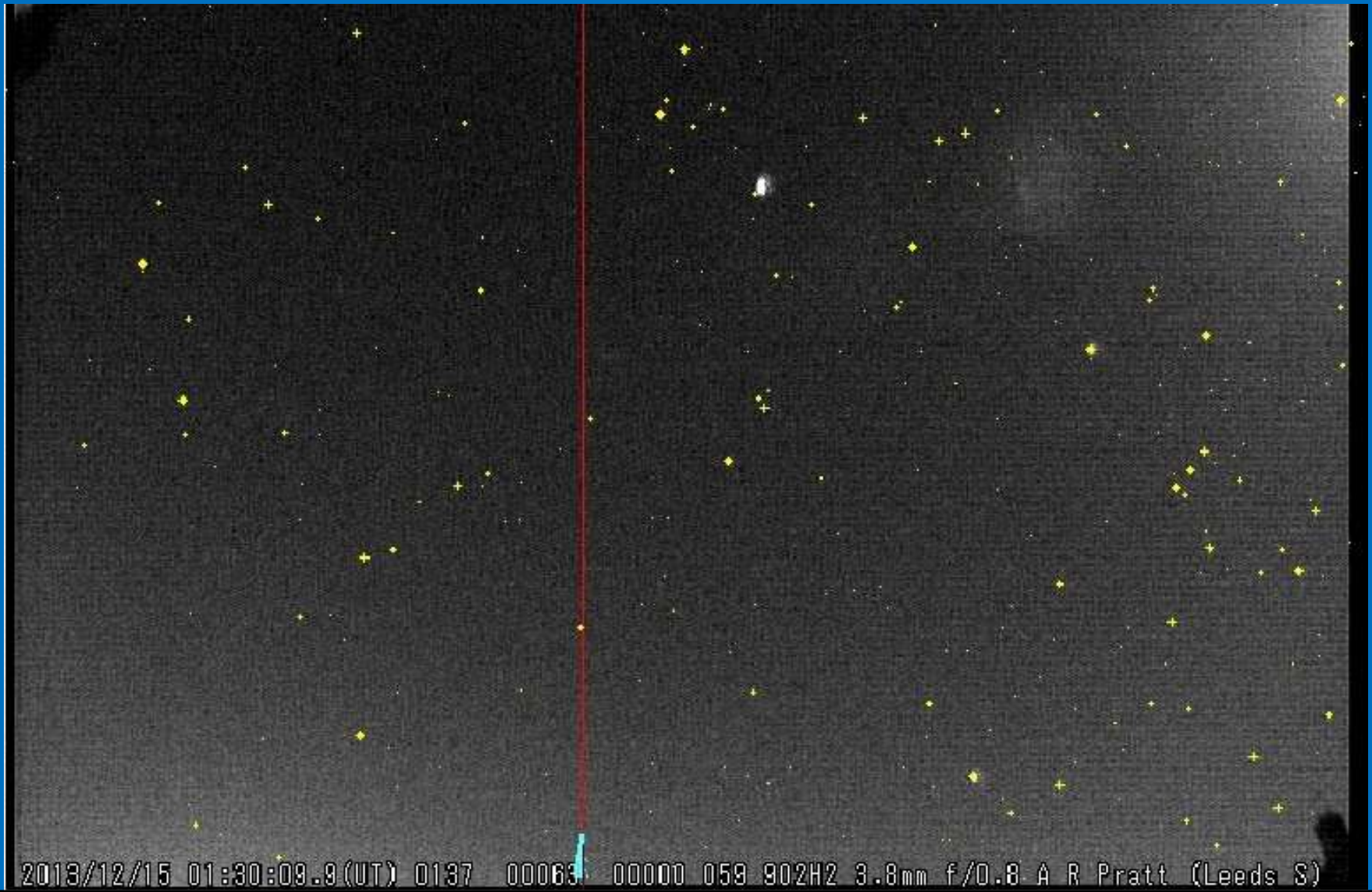
Checking trail alignment

The corrected alignment looks much improved



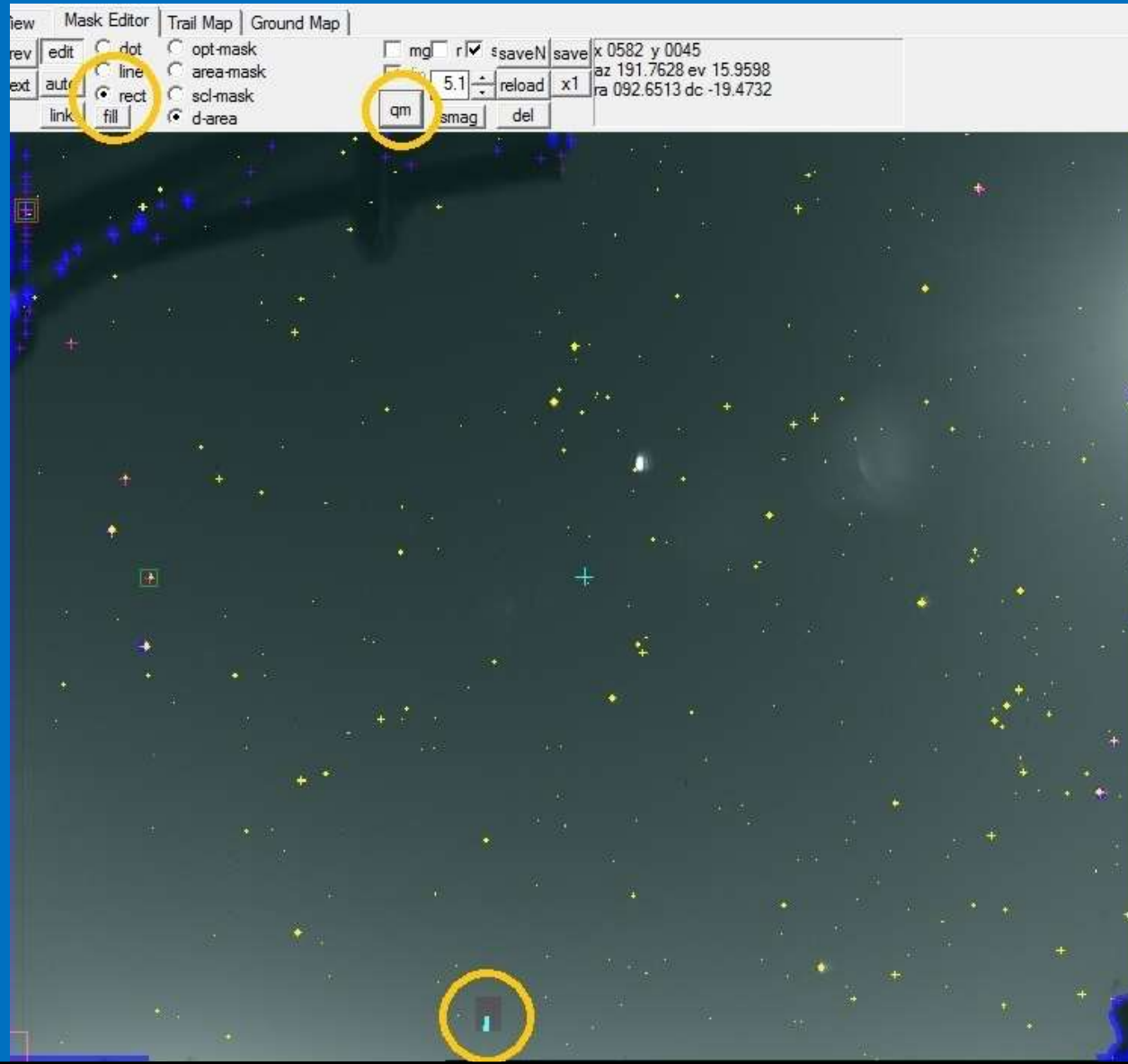
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Slight misalignment



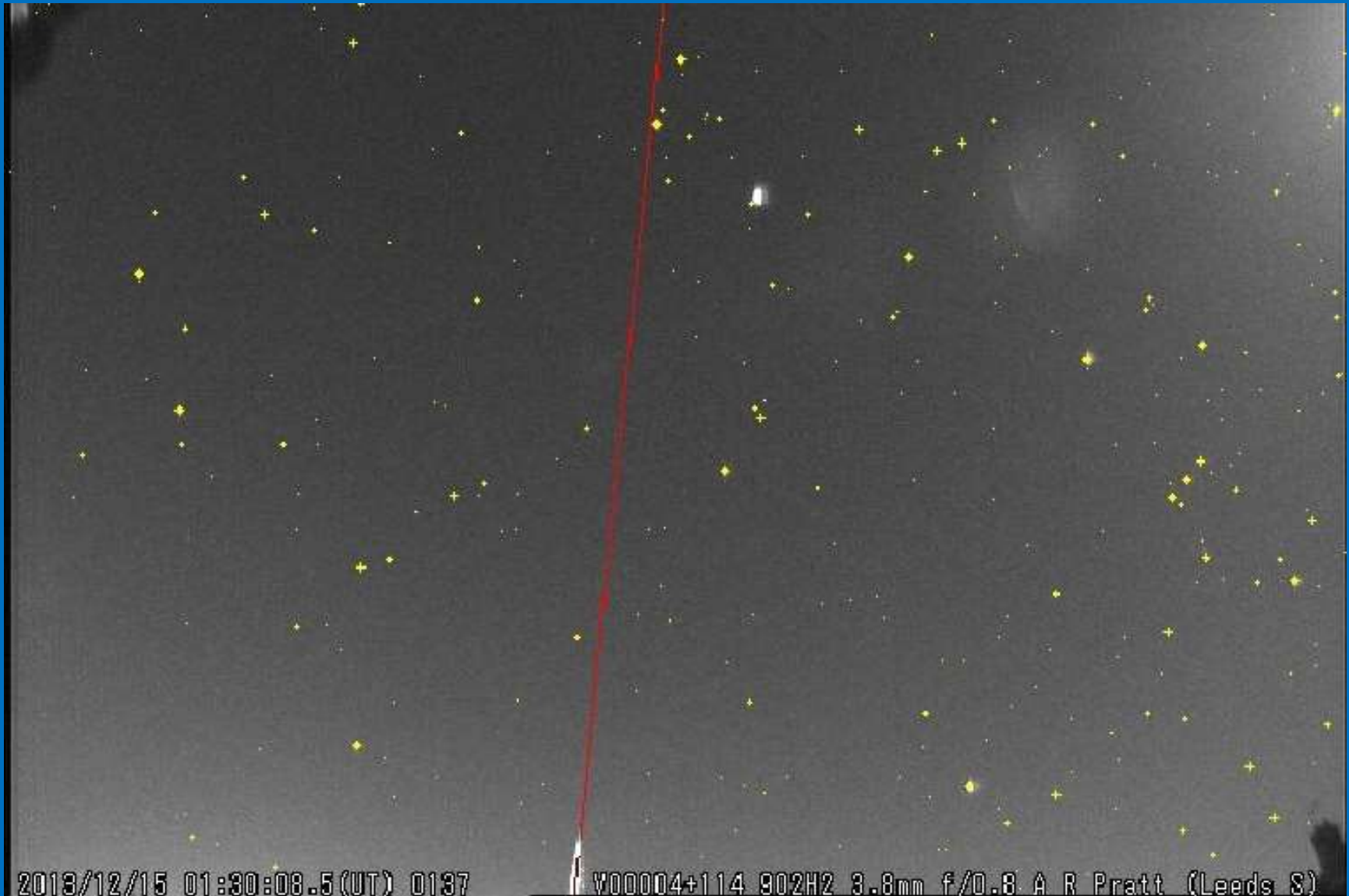
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Mask Editor – 'rect' mask



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Alignment corrected



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'ddl' and 'leap'

Parameters in the Profile / Analyze tab

Affect the detection thresholds

If object is 'none', 'noise' or 'slow' –
reduce 'ddl'

If object is 'curve' or 'flash' –
Increase 'ddl'

Increase / decrease 'leap'
to process multiple objects

The screenshot shows the 'Profile/Analyze' tab of the UFO Analyser software. The interface is organized into several sections:

- Top Bar:** Contains tabs for 'Main', 'Profile/Analyze', 'Class', 'Plot', and 'Uty'. Below these are buttons for 'read P', 'save P', and 'save A'.
- Object Identification:** Fields for 'lid' (Leeds), 'sid' (NW), 'observer' (A_R_Pratt), and a checked 'intlc' checkbox.
- Camera Settings:** Fields for 'cam' (ec_902H2), 'lens' (im_f/0.75), 'cap', and an unchecked 'bbf' checkbox.
- Location and Time:** Fields for 'lng' (-1.6077), 'lat' (53.8376), 'alt' (115), 'tz' (0), 'tme' (1.0), 'memo', and 'step' (000.100).
- Detection Thresholds:** A grid of checkboxes and numerical values for parameters like 'fovH', 'yx', 'atc', 'k4', 'k3', 'k2', 'dx', 'dy', 'rot', 'az', 'ev', and 'move'.
- Adjustment Parameters:** Fields for 'adj pos all', 'ddpix lim', 'mask 0', 'link 0', and a vertical stack of 'A', 'D', 'J', 'U', 'S', 'T' with 'pos 3' and 'mag'.
- Analysis Parameters:** Fields for 'levH' (255), 'magH' (3.4325), 'levL' (151), 'magL' (4.0000), and 'bvf' (-0.30).
- Bottom Section:** Includes a checked 'retry' checkbox, and 'ddl' (5) and 'leap' (40) fields which are circled in orange. Other fields include 'f1' (-1), 'f2' (-1), 'click1', 'click2', 'mod h', 'add a obj', 'delete a obj', and 'delete a cip'.

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'ddl' and 'leap'

alloff

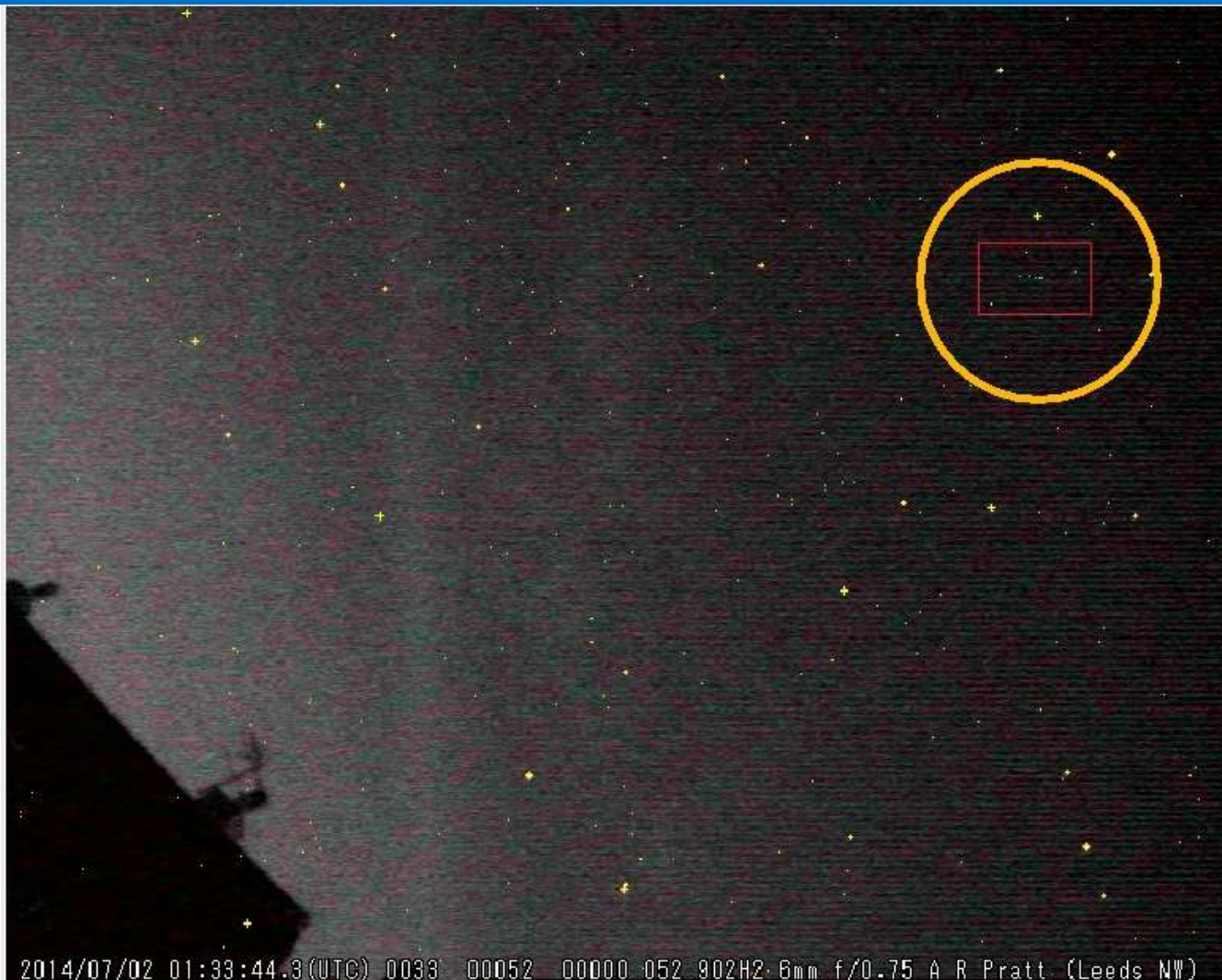
Date ☒ all ☐ range ☐ latest
Y 2007 M 1 D 1 H 12 ... 1 days
read dir analyze all A ddl 5 > Rxml > Mcsv
Doc C:\Users\Alex\Documents\2014-NW\201407 ...

8 clips delete a obj delete a clip

class	m	sec	m...	cdeg	dr	dv	Vo	av
_fast		0.060	2.84	0.003	-...	-1	-1.0	42.84

clip_name o class m... sec r

M20140701_225123_Leeds_NW_...	1	lw_SSS	-0.8	1.3	A
M20140701_234255_Leeds_NW_...	1	spo	1.2	0.1	A
M20140702_003614_Leeds_NW_...	1	spo	0.5	0.5	A
M20140702_010427_Leeds_NW_...	1	sm_0...	0.4	0.1	A
M20140702_012750_Leeds_NW_...	1	spo	0.9	0.3	A
M20140702_013343_Leeds_NW_...	1	_fast	2.8	0.1	A
M20140702_014443_Leeds_NW_...	1	sm_0...	0.4	0.3	A
M20140702_015148_Leeds_NW_...	1	spo	1.9	0.1	A



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'ddl' and 'leap'

ing -1.6077 lat 53.8376 alt 115 tz 0

time 1.0 memo step 000.100

☒ fovh 53.6878 ☒ yx 0.9496 ☐ atc 58.3

☐ k4 0.0359 ☒ k3 -0.0380 ☒ k2 0.0393

☒ dx -8.07 ☒ dy 14.54 ☒ rot -71.2796

☒ az 92.4559 ☒ ev 44.1845 move

adj pos all ddpix lim mask 0 link 0

A D J U S T pos 3 0.00001(

levH 255 magH 3.4325

mag levL 151 magL 4.0000 bvf -0.30

analyze $n=26 \ m=-2.50 \log(L)+9.43 \ (+/-1.66)$

☒ retr ddl 0 leap 40 f1 -1 f2 -1

click1 click2 add h add a obj delete a obj delete a cip

class	m	sec	m...	cdeg	dr	dv	Vo	av
sm_026	0.060	2.43	0.002	1.8	-16	59.7	28.5	

clip_name o class m... sec c

M20140701_225123_Leeds_NW...	1	lw_SSS	-0.8	1.3	7
M20140701_234255_Leeds_NW...	1	spo	1.2	0.1	7
M20140702_003614_Leeds_NW...	1	spo	0.5	0.5	7
M20140702_010427_Leeds_NW...	1	sm_0...	0.4	0.1	7
M20140702_012750_Leeds_NW...	1	spo	0.9	0.3	7
M20140702_013343_Leeds_NW...	1	sm_0...	2.4	0.1	7
M20140702_014443_Leeds_NW...	1	sm_0...	0.4	0.3	7
M20140702_015148_Leeds_NW...	1	spo	1.9	0.1	7



2014/07/02 01:33:44.3(UTC) 0033 00052 00000 052 902H2-6mm f/0.75 A R Pratt (Leeds NW)

UFO Analyser - Leeds

Object count - 2 concurrent meteors



UFO Analyser - Leeds

Object count - 2 concurrent meteors



UFO Analyser - Leeds

Object count - 2 concurrent meteors



UFO Analyser - Leeds

Object count - 2 concurrent meteors

UFOAnalyzerV2 C:\Users\Alex\Documents\2013-NW\20131213\20131213_M20131213_234858_Leeds_NW

Main | Profile/Analyze | Class | Plot | Uty |

Clip dir use dir profile
add * C:\Users\Alex\Docu... p_nw_20131213...
allon
alloff

Date all range latest
Y 2007 M 1 D 1 H 12 ... 1 days
read dir ^ analyze all A ddl 5 > Fxml > Mcsv
Doc \Alex\Documents\2014-NW\201407\20140716 ...

207 clips delete a obj delete a clip


class	m	sec	m...	cdeg	cde...	dr	dv
J5_Gem		0.400	-1...	0.016	0.0451	0.6	6
J5_Gem		0.180	1.03	0.011	0.0345	0.1	5

clip_name o class m... sec mec

M20131213_232453_L...	1	J5_G...	1.0	0.1	AJM
M20131213_232652_L...	1	J5_G...	-0.2	0.5	AJM
M20131213_233121_L...	1	J5_M...	0.8	0.1	AJM
M20131213_233212_L...	1	J5_n...	1.6	0.1	AJM
M20131213_233526_L...	1	J5_G...	1.9	0.2	AJM
M20131213_233730_L...	1	J5_G...	1.7	0.2	AJM
M20131213_233741_L...	1	spo	1.3	0.5	AJM
M20131213_234138_L...	1	J5_G...	-2.1	0.8	AJM
M20131213_234319_L...	1	J5_G...	0.1	0.4	AJM
M20131213_234635_L...	1	J5_G...	1.9	0.2	AJM
M20131213_234731_L...	1	J5_G...	1.2	0.4	AJM
M20131213_234858...	2	J5_G...	-1.5	0.4	AJM
M20131213_234944_L...	1	J5_G...	-0.8	0.6	AJM
M20131213_235105_L...	1	J5_G...	1.2	0.2	AJM
M20131213_235147_L...	1	J5_G...	0.1	0.2	AJM
M20131213_235334_L...	1	J5_G...	-0.6	0.6	AJM
M20131213_235344_L...	1	J5_G...	-1.8	0.6	AJM
M20131213_235644_L...	1	J5_G...	0.6	0.2	AJM
M20131214_002217_L...	1	J5_G...	1.9	0.1	AJM
M20131214_002406_L...	1	J5_G...	-0.0	0.6	AJM

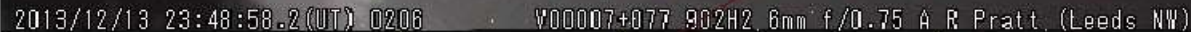
View Mask Editor Trail Map Ground Map

prev Still ☒ HitM ☐ AreaM ☐ SclM ☐ Az ☐ Ra ☒ S 5.9 save x 0275 y 0033 b 090 m 4.1
next > < > < > < > D.I.stepping ☐ save click x1 az 311.9317 ev 32.0585
ra 335.4456 dc 49.6332
D=184.62km(H:100km) am=2.8



2013/12/13 23:48:58.2(UT) 0208 V00007+077 902H2 6mm f/D.75 A.R Pratt. (Leeds NW)

Object count - 2 concurrent meteors



UFO Analyser - Leeds

Object count - A sporadic meteor and a 'curve' event (noise)

UFOAnalyzerV2 C:\Users\Alex\Documents\2014-NW\201406\20140607\M20140608_001013_Leeds_NW_NW

Main | Profile/Analyze | Class | Plot | Uty | View | Mask Editor | Trail Map | Ground Map |

Clip dir use dir profile
add * C:\Users\Alex\Docu... p_nw_20140607....
allon
alloff

Date: ☒ all ☐ range ☐ latest
Y 2007 M 1 D 1 H 12 .. 1 days
read dir ^ analyze all A ddl 4 > Fxml > Mcsv
Doc C:\Users\Alex\Documents\2014-NW\201406 ...

6 clips delete a obj delete a clip

class	m	sec	m...	cdeg	dr	dv	Vo
spo	0.220	1.81	0.018	-...	-1	-1.0	
_curve	1.540	3.67	0.679	-...	-1	-1.0	

clip_name o class m... sec media
M20140607_232252_L... 1 spo 3.2 0.2 AJM xX
M20140607_233050_L... 1 Iw_G... 0.2 0.1 AJM xX
M20140607_233858_L... 1 spo 1.7 0.1 AJM xX
M20140607_234108_L... 1 spo 2.3 0.1 AJM xX
M20140608_001013_L... 2 spo 1.8 0.2 AJM xX
M20140608_003128_L... 1 spo -0.6 0.1 AJM xX

2014/06/08 00:10:13.8 (UTC) 0030 V000005+Q55 902H2 6mm f/0.75 A R Pratt (Leeds NW)

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Object count - Use 'delete a obj' to remove the '_curve' event

UFOAnalyzerV2 C:\Users\Alex\Documents\2014-NW\201406\20140607\M20140608_001013_Leeds_NW_NW

Main | Profile/Analyze | Class | Plot | Uty | View | Mask Editor | Trail Map | Ground Map |

Clip dir use dir profile
add * C:\Users\Alex\Docu... p_nw_20140607....
allon
alloff

Date: all range latest
Y 2007 M 1 D 1 H 12 days
read dir ^ analyze all A ddl 4 > Rxml > Mcsv
Doc C:\Users\Alex\Documents\2014-NW\201406
6 clips delete a obj delete a clip

class	m	sec	m...	deg	dr	dv	Vo
spo	0.220	1.81	0.018	-...	-1	-1.0	
_curve	1.540	3.67	0.679	-...	-1	-1.0	

clip_name o class m... sec media
M20140607_232252_L... 1 spo 3.2 0.2 AJM xX
M20140607_233050_L... 1 Iw_G... 0.2 0.1 AJM xX
M20140607_233858_L... 1 spo 1.7 0.1 AJM xX
M20140607_234108_L... 1 spo 2.3 0.1 AJM xX
M20140608_001013_... 2 spo 1.8 0.2 AJM xX
M20140608_003128_L... 1 spo -0.6 0.1 AJM xX

2014/06/08 00:10:13.8 (UTC) 0030 V000005+Q55 902H2 6mm f/0.75 A R Pratt (Leeds NW)

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Object count - Multiple alignments to a single meteor trail

UFOAnalyzerV2 C:\Users\Alex\Documents\2014-NW\201406\20140608\M20140608_222947_Leeds_NW_NW

Main | Profile/Analyze | Class | Plot | Uty |

Clip dir use dir profile
add * C:\Users\Alex\Docu... p_nw_20140608....
allon
alloff

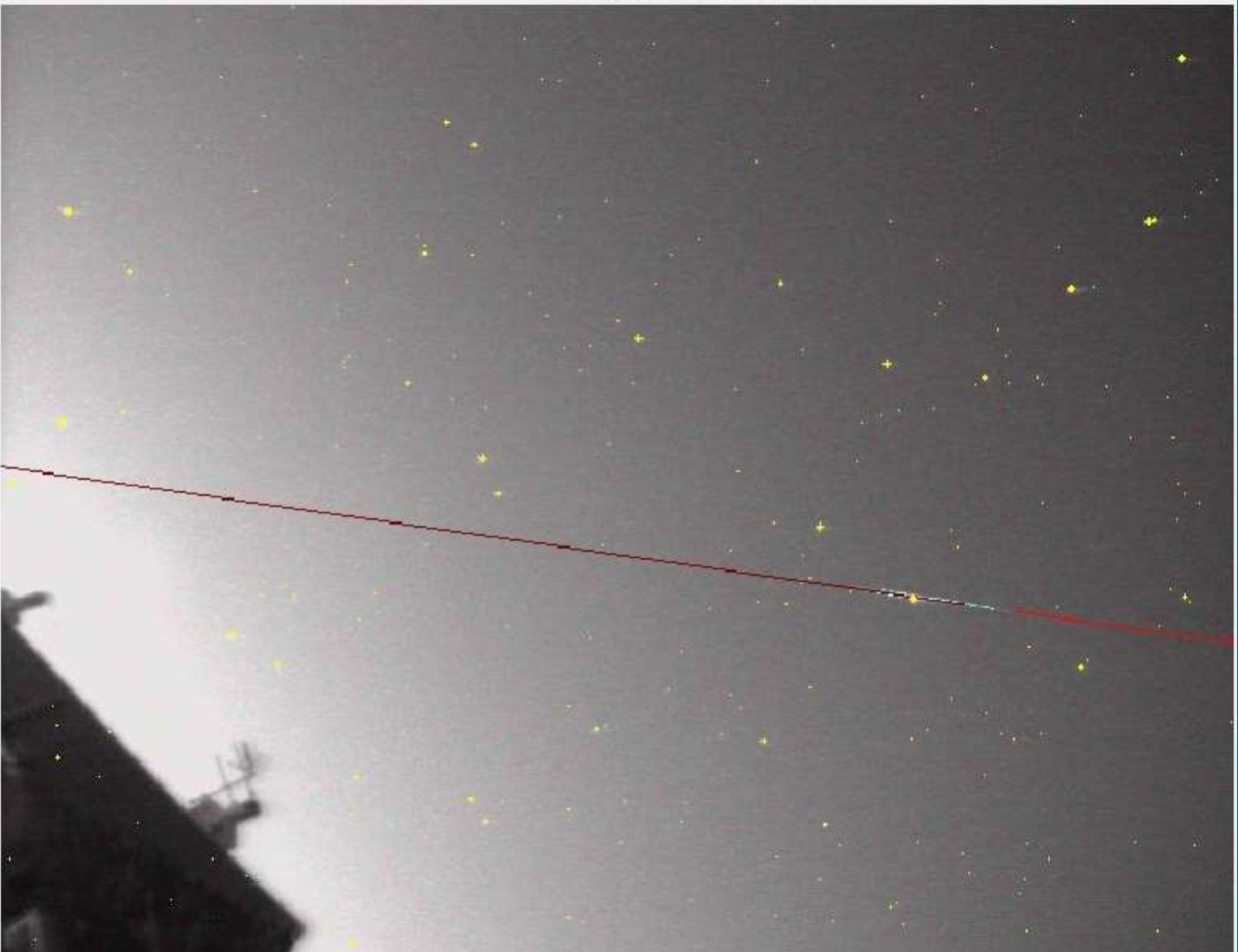
Date all range latest
Y 2007 M 1 D 1 H 12 .. 1 days
read dir ^ analyze all A ddl 4 > Rxml > Mcsv
Doc C:\Users\Alex\Documents\2014-NW\201406 ...
5 clips delete a obj delete a clip

class	m	sec	m...	deg	dr	dv	Vo
spo	0.100	2.20	0.006	-...	-1	-1	
spo	0.140	1.49	0.072	-...	-1	-1	

clip_name	o	class	m...	sec	media
M20140608_221545_L...	1	Iw_SSS	-0.1	1.0	AJM xX
M20140608_222947_...	3	_cur...	1.2	0.2	AJM xX
M20140608_230500_L...	1	Iw_N...	1.6	0.5	AJM xX
M20140608_232927_L...	1	Iw_N...	2.3	0.3	AJM xX
M20140608_233929_L...	1	spo	-0.7	1.1	AJM xX

View | Mask Editor | Trail Map | Ground Map |

prev Still ☒ HitM ☐ AreaM ☐ ScIM ☐ Az ☐ Ra ☒ S 5.9 save x 0198 y 0026 b 227 m 3.4
next > << >> >|| H ☐ D.I.stepping ☐ save click x1 az 309.4847 ev 24.6706
ra 125.3892 dc 42.7305
D=231.13km(H:100km) am=1.6



2014/06/08 22:29:47.7(UTC) 0004 W00006+064 902H2 6mm f/0.75 A R Pratt (Leeds NW)

UFO Analyser - Leeds

Timestamps

Synchronise the *UFO Capture* PC with an accurate time source

UFO Orbit has a multi-event timing tolerance of 3s

Timing errors can produce:

- Missed mutual events
- Incorrect ground tracks
- Inaccurate orbital elements

A clip triggered by a bird or 'plane sometimes captures a meteor
The meteor could be given an erroneous timestamp

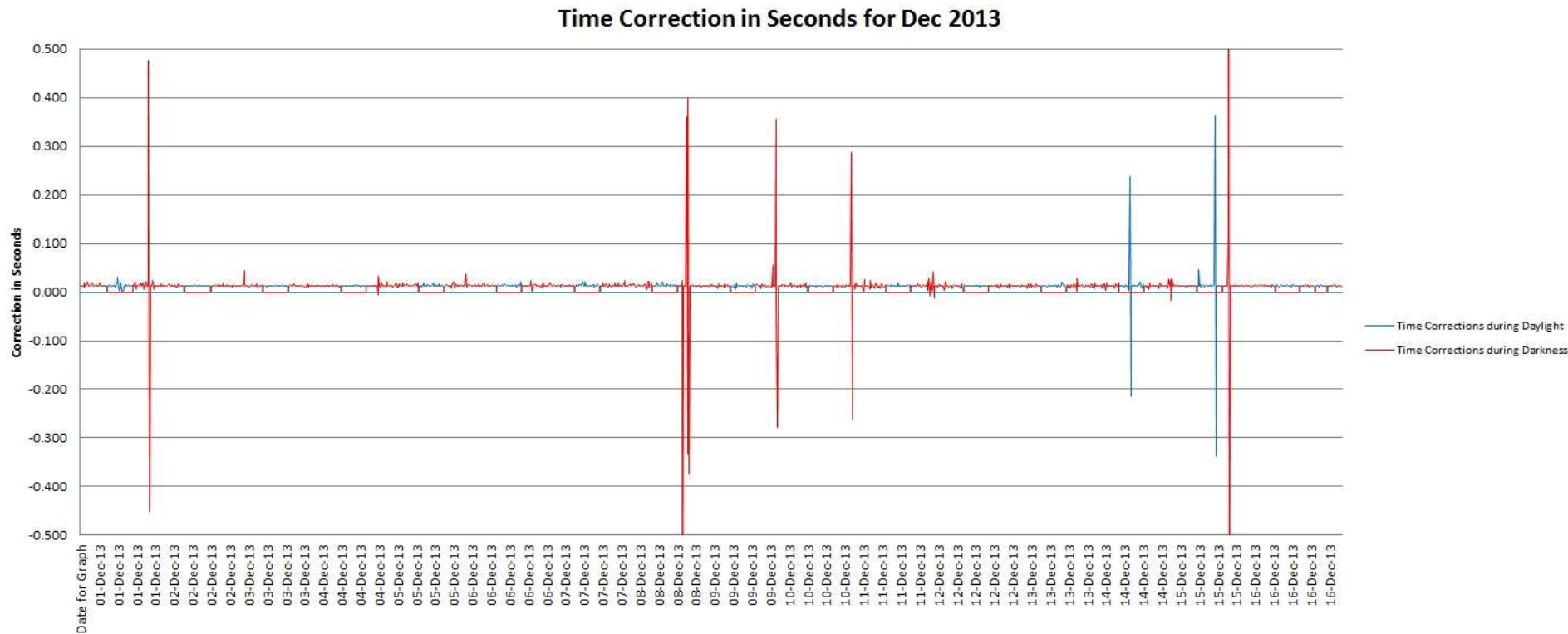
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Accurate timestamps

Default 'Windows Internet Time'

Dimension 4 <http://www.thinkman.com/dimension4/>

Internet Time Service (SNTP) – every 15 min



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Non-meteor trigger – a bird



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Timing corrections

Uty tab – time adjust – *all* clips

Bespoke timing correction:

Backup copy of M?.xml file

Edit original M?.xml file – corrected timestamp

Delete its M?A.XML file

Run *UFO Analyser*

Save the new M?.csv file

UFO Analyser - Leeds

“There’s more to life than Analyze All”

Quality checks:

Stellar registration profiles

Trail alignments

Timing checks

Get the best results from our capture data!

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“There’s more to life than Analyze All”

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Recommended reference sources

UFO Capture Night Sky Observation Guide

<http://sonotaco.com/soft/NSOG/index.html>

UFO Analyser User's Manual

http://sonotaco.com/soft/download/UA2Manual_EN.pdf