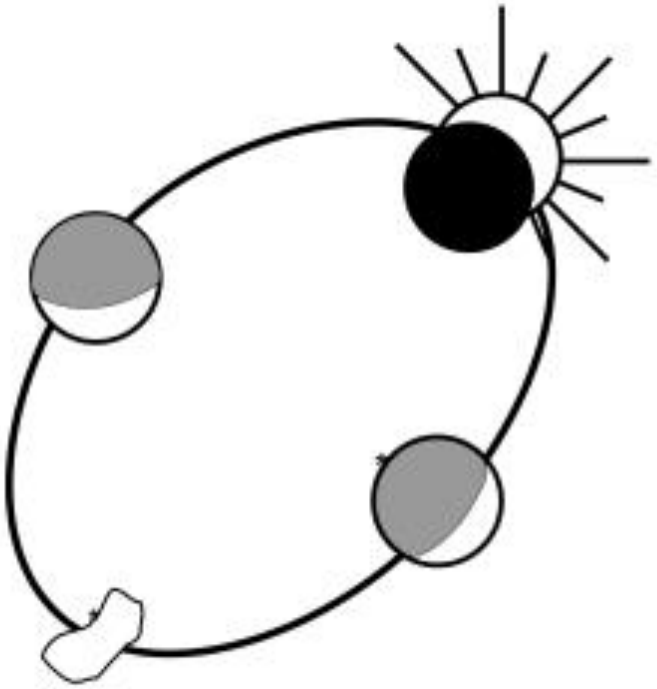
The 40-th Anniversary of the Section for Observations of Positions and Occultation in Poland



XXXVIII European Symposium on Occultations Projects
Aug 30th – Sep 2nd, 2019 - Paris

Wojciech Burzyński, M. Eng.

The Occultation Section of the Polish Amateur Astronomers Society

- The Occultation Section of the Polish Amateur Astronomers Society (*pol. SOPiZ PTMA*) was founded in **29th April, 1979**.

  IOTA was born in 1975, IOTA/ES in 1976.

- „**Golden Ages**" between 1991 and 2001 when over 40 members were been able to observe over 600 total lunar occultations per year – it was 6-9 % of global observations. Grazing expeditions in 90's have had over dozen people.

- „**Dark Ages**" from 2005 to 2015 – internal discussions on the further form of the Section and the ILOC announcement to stop collecting total lunar occultation observations since March 2009 caused strong weakening of observers activity.

- Unfortunately between 2012 and 2015 our most active and charismatic members (**Paweł Maksym, Roman Fangor, Jerzy Speil et al.**) have passed away. The biggest problem now is the lack of new members and the aging of those present.

- Since 2015…. - revival ?, since 2019…. new co-ordinator */ W. Burzyński/*

The Occultation Section of the PAAS - developmental milestones

- **1980** – the Electronic Time Recorder (*pol. „ERC”*) made by R. Fangor
- **1982** – first use of electronic stopwatch for occultation work
- **1985** – first use of photomultiplier for occultation work
- **1986** – occultation software for ZX Spectrum by M. Zawilski, R. Fangor, J. Wiland
- **1989** – „ERC READ DATA” – software for reading audio casette tapes – J. Wiland
- **1990** – first use of sensitive CCD TV camera for occultation work
- **1990** – first use of the DCF module for occultation work – L. Benedyktowicz
- **1993** – use of blinking LED in the CCD's field of view
- **1993** – the Microprocessor Time Recorder (*pol. „MRC”*) made by J. Wiland
- **1997** – first video time inserter based on the DCF signal made by J. Wiland
- **1997** – first use of the GPS handheld device - station coordinates measurments
- **2013** – first video time inserter based on the GPS signal made by T. Wężyk
- **2015** – the VTI based on the Arduino board (open source project) by P. Smolarz

The Occultation Section of the PAAS

Since 1984 members of PAAS Occultation Section have participated in European Symposium on Occultation Projects (ESOP). Four ESOPs were organized in Poland:

1986: Warsaw / Łódź

2000: Łódź

1994: Kraków

2009: Niepołomice near Cracow *(photo below)*

next one ……. 27.08 - 01.09. 2021, Białystok – NE Poland

The Occultation Section of the PAAS

ASTEROIDAL OCCULTATION

In 1988 first positive asteroidal occultations have been recorded:

- **14 IV 1988** - SAO 120975 – the 7.3 mag star and (772) Tanete at Olsztyn Observatory, N Poland, by **Jan Tatyża** (however without timing)

- **09 VIII 1988 - SAO 56117, 7.5 mag star and (626) Notburga at Książ Castle, SW Poland, by Jerzy Speil** ***(also missing near Lublin, E Poland, was observed by Mieczysław Paradowski)***

- **01 I 1994** - PPM 96118, 8.2 mag star and (144) Vibilia - the second successful asteroidal occultation by **Witold Piskorz** at Niepołomice Observatory, S Poland (1st positive on the world in 1994!)

The Occultation Section of the PAAS

COLLECTIVE ASTEROIDAL OCCULTATION WITH POSITIVE RESULTS :

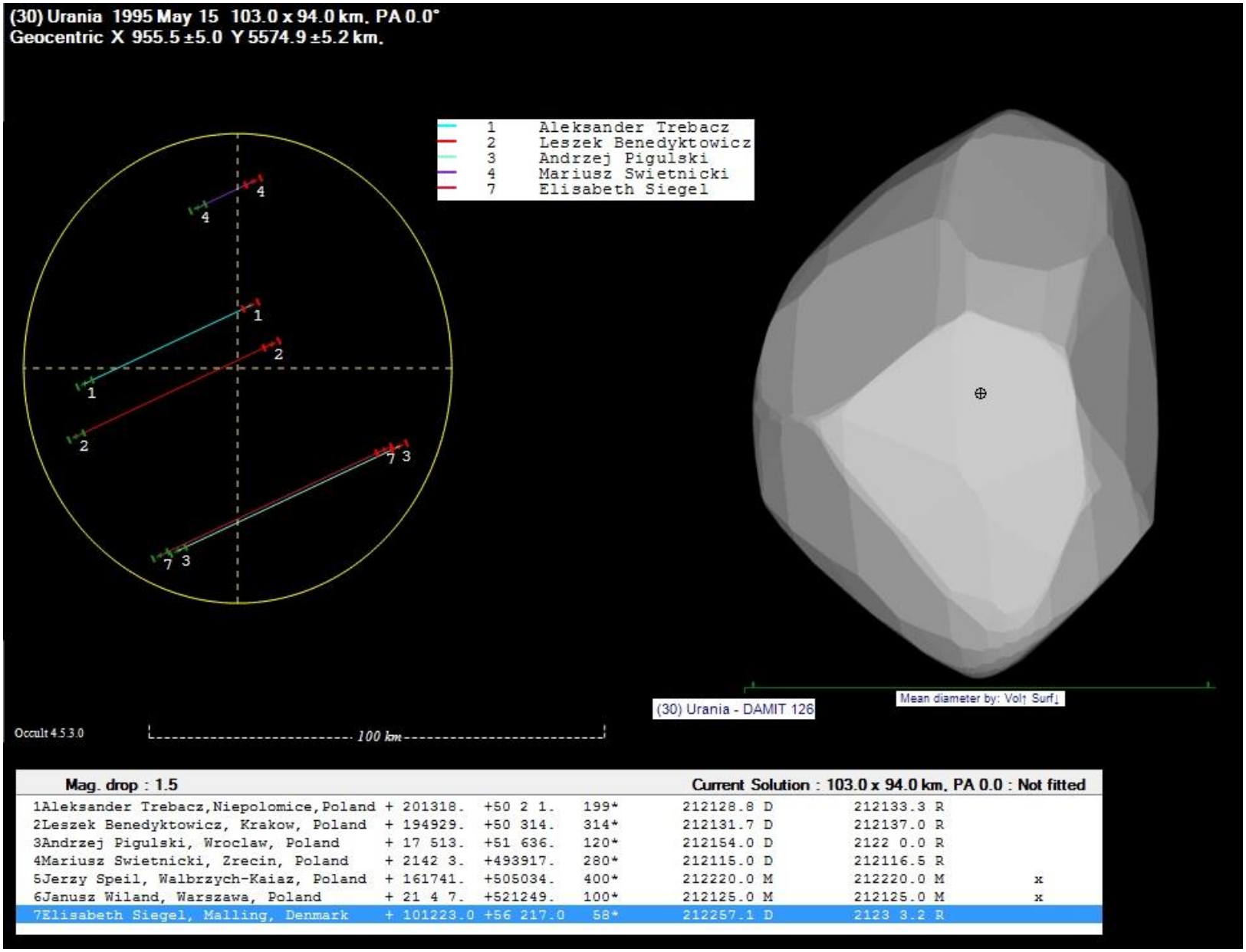
- **15 V 1995** - **(30) Urania - the first collective observation ever,**
  - 5 observers, 5 POSITIVE !

- 26 III 1998 - (578) Heppelia – 2 observers
- 17 IX 2002 - (345) Tercidina – 2 observers have travelled to Slovakia

- **26 VIII 2003** - **(420) Bertholda – 5 observations POSITIVE**
  and 12 MISS (135 observers in total !!)

- 22 XII 2003 - (925) Alphonsina – 4 observers
- 07 VI 2011 - (173) Ino – 2 observers
- 30 IX 2017 - (217) Eudora – 1 of 2 POSITIVE
- 20 V 2018 - P5M06 Himalia – 3 of 4 POSITIVE
- **31 III 2019 – (259) Aletheia – 1 of 5 POSITIVE**

(30) Urania occultation in 1995 – 5 positive obs.

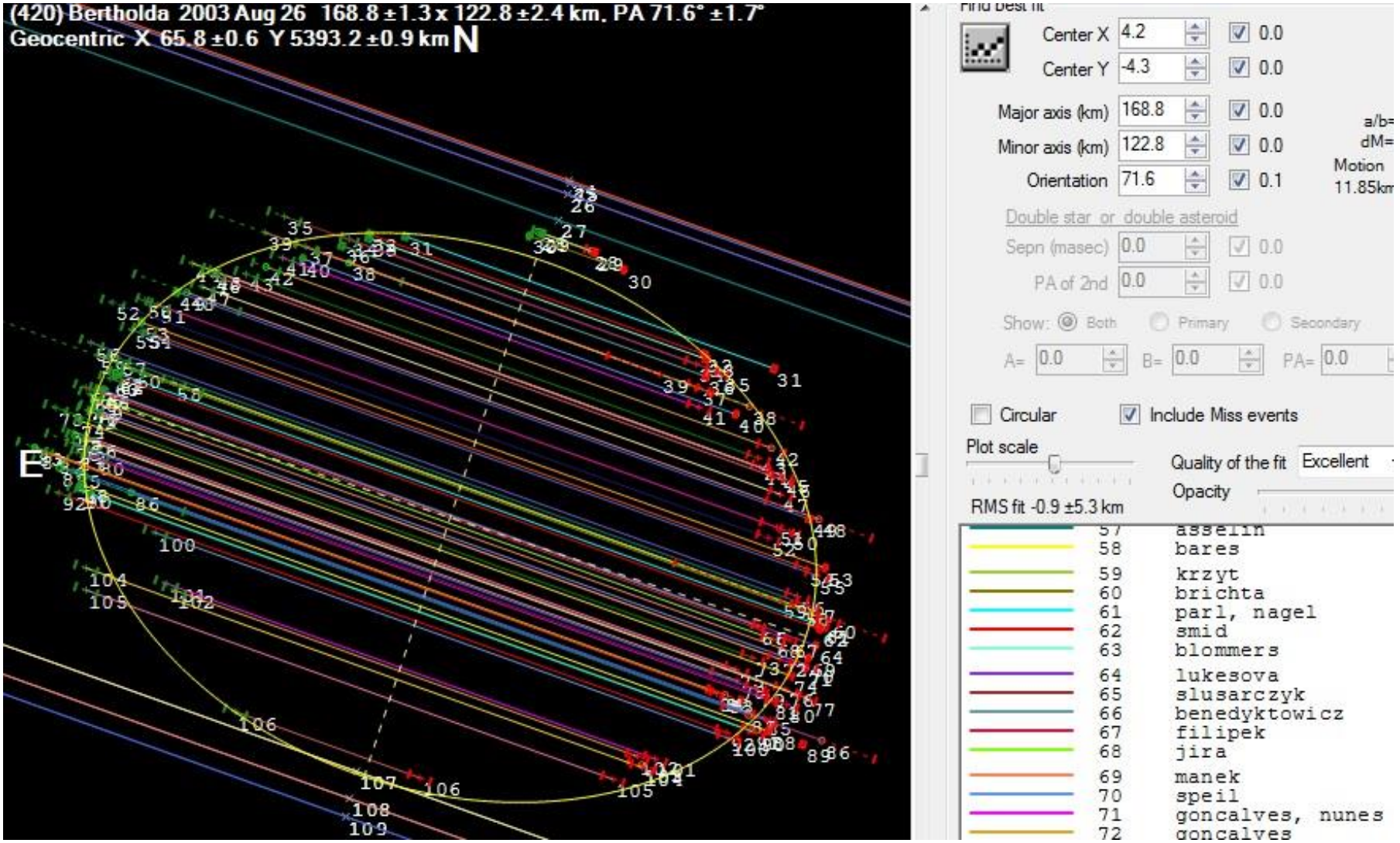


Mag. drop : 1.5				Current Solution : 103.0 x 94.0 km, PA 0.0 : Not fitted		
1Aleksander Trebacz,Niepolomice,Poland	+ 201318.	+50 2 1.	199*	212128.8 D	212133.3 R	
2Leszek Benedyktowicz, Krakow, Poland	+ 194929.	+50 314.	314*	212131.7 D	212137.0 R	
3Andrzej Pigulski, Wroclaw, Poland	+ 17 513.	+51 636.	120*	212154.0 D	2122 0.0 R	
4Mariusz Swietnicki, Zrecin, Poland	+ 2142 3.	+493917.	280*	212115.0 D	212116.5 R	
5Jerzy Speil, Walbrzych-Kaiaz, Poland	+ 161741.	+505034.	400*	212220.0 M	212220.0 M	x
6Janusz Wiland, Warszawa, Poland	+ 21 4 7.	+521249.	100*	212125.0 M	212125.0 M	x
7Elisabeth Siegel, Malling, Denmark	+ 101223.0	+56 217.0	58*	212257.1 D	2123 3.2 R	

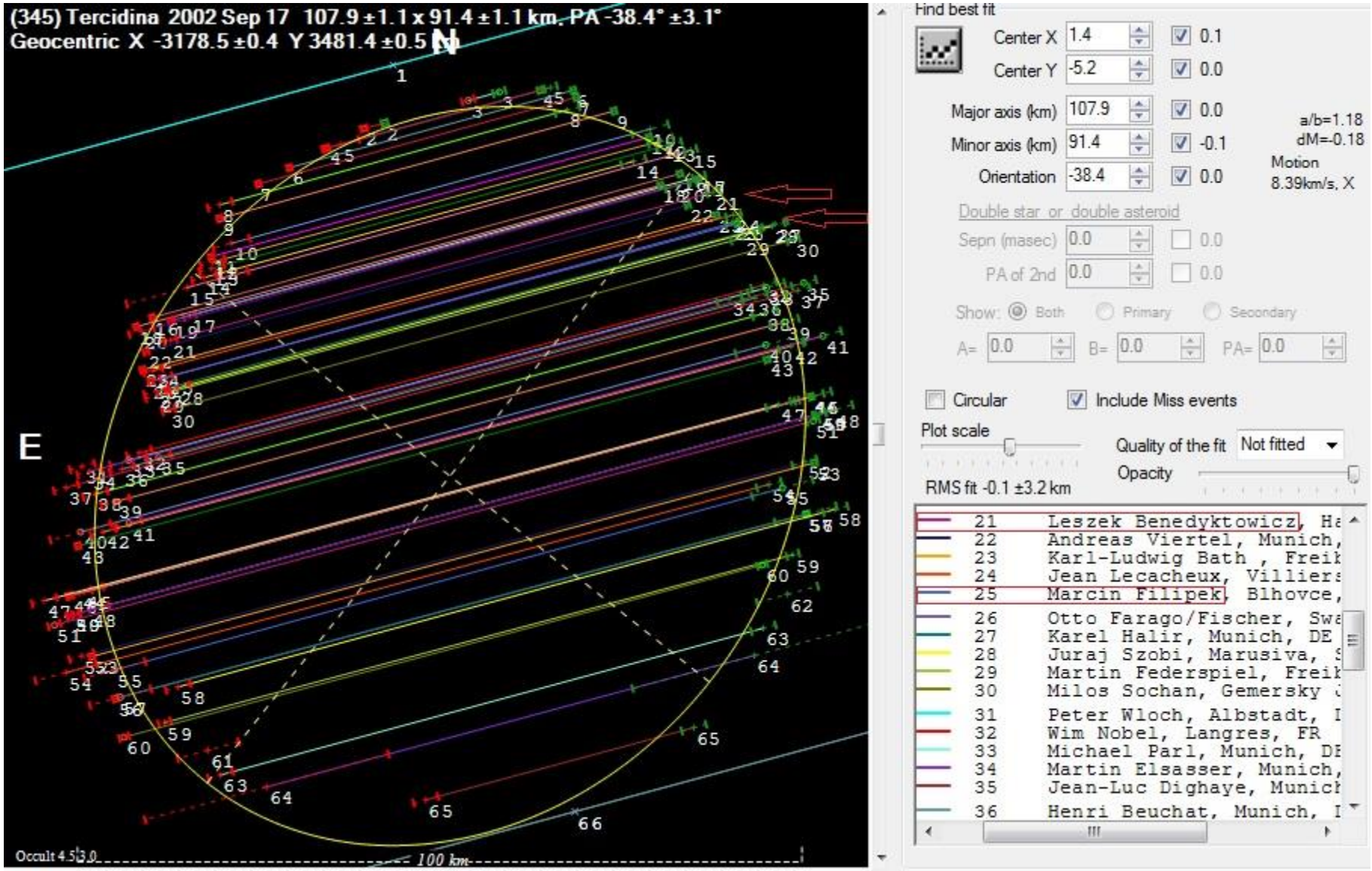
Bertholda occultation - 17 of 135 were from Poland

The 3rd place in number of observers recording asteroidal occultation ever...

... and the winner is the occultation of (472) Roma in 2010 with 231 observers from Europe.



Tercidina occultation – expedition to Slovakia



Asteroidal occultation reports 1988 -1999

YEAR	TOTAL	NEGATIVE	POSITIVE	REMARKS
1988			1	first „positive” ever - J. Speil
1989				**occultation of 28 Sgr by Titan – 10 obs.**
1990				
1991				
1992				
1993			1	second „positive” ever - W. Piskorz
1994				
1995			6	(30) Urania event – 5 positives
1996				
1997				
1998			3	
1999				

Asteroidal occultation reports 2000 - 2009

YEAR	TOTAL	NEG	POS	REMARKS
2000	27	27	-	
2001	50	50	2 (IOTA)	13 negatives in one event – (2525) O'Stean on May, 8
2002	23	22	**1** (+2, IOTA)	Tethys event observed by W. Burzyński
2003	32	23	9 (8 - IOTA)	Bertholda = 5 positives + 13 negatives
2004	18	16	2 (3 - IOTA)	
2005	31	30	1	
2006	12	11	1	
2007	11	10	1	
2008	11	11	-	
2009	8	7	1	

Asteroidal occultation reports 2010 -2019

YEAR	TOTAL	NEG	POS	REMARKS
2010	1	1	-	
2011	9	7	2	
2012	4	4	-	all events observed by M. Filipek
2013	3	3	- (2,IOTA)	all events observed by M. Filipek
2014	5	5	- (2,IOTA)	
2015	7	7	- (4,IOTA)	
2016	9	8	1 (Pluto) (+2, IOTA)	Pluto observed by G. Murawski
2017	13	10	3 (7,IOTA)	
2018	16	7	9	
2019	18 …	12 …	5 …	
TOTAL	**367**	**326**	**41**	

New double star - first Polish detection by an occultation methode on Jul 26, 2018

The occultation of TYC 1769-01181-1, 11.9 mag star, by the (476) Hedwig was the first case of discovery of the double star by the Polish observer, **Maciej Jarmoc**, by using an occultation-method.

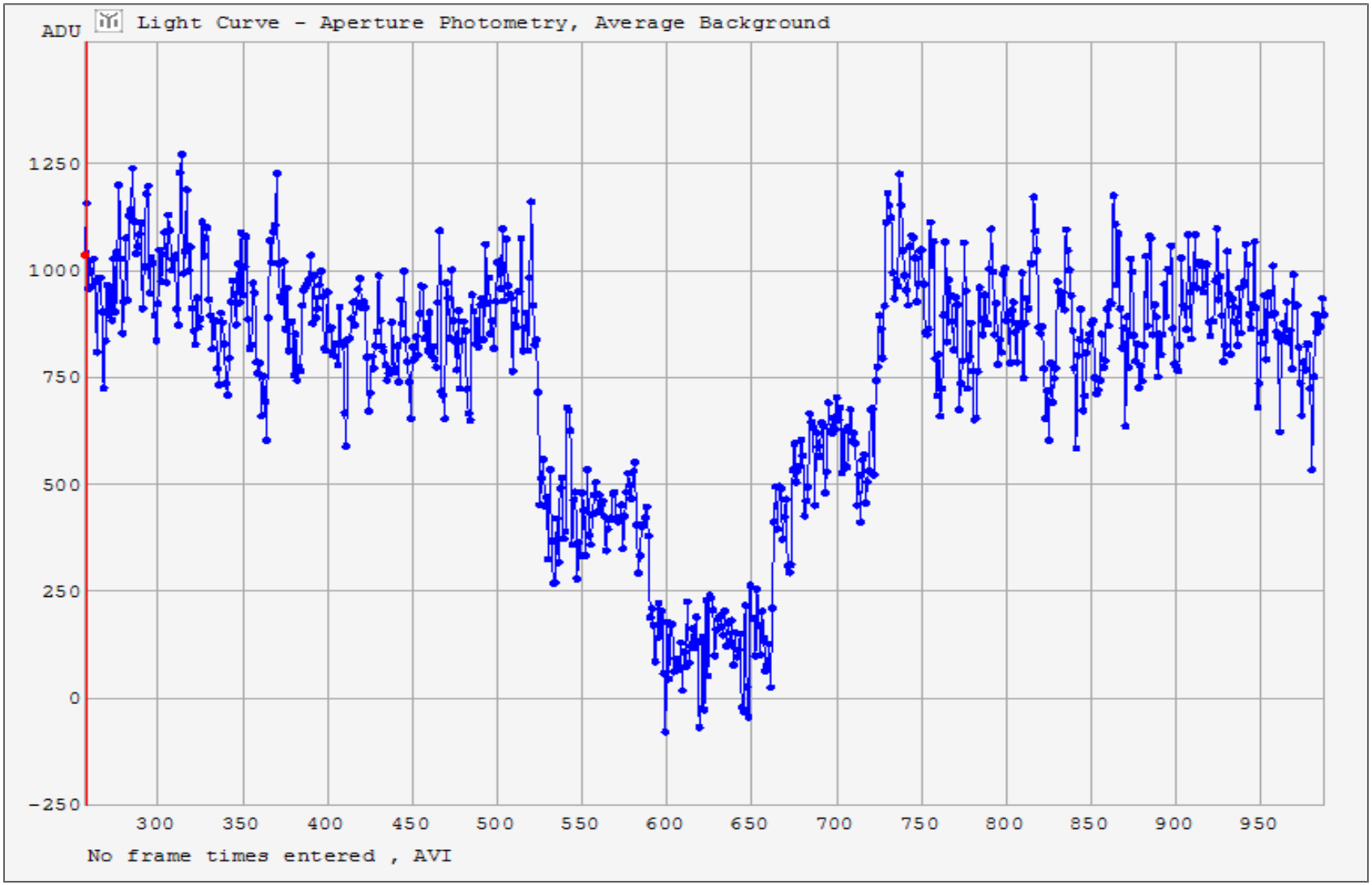
At the same time, observers from
- Slovak Republic (**Peter Delincak** - only one component occulted)
- Czechia (**Jiŕi Kubanek** - both components occulted)

made co-discoveries about the fact that the **star was new close double with the components separation of**

0.040"

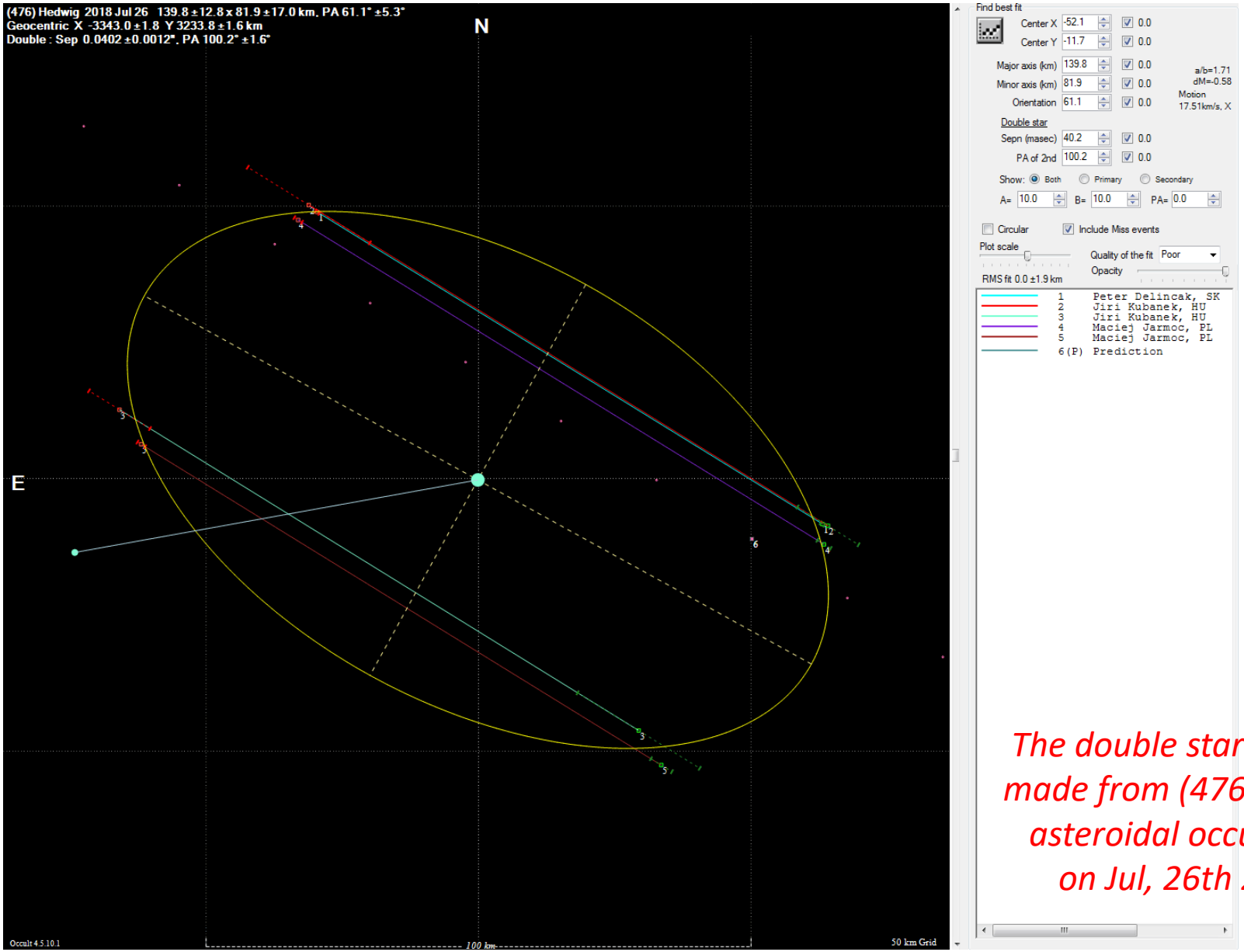
The occultation path of (476) Hedwig asteroidal occultation on Jul, 26th 2018 with positive observation sites marked.

(476) Hedwig occultation results



The light curve recorded by Maciej Jarmoc during (476) Hedwig asteroidal occultation on Jul 26, 2018. The stepped LC means double star occultation by the asteroid.

(476) Hedwig occultation results



The double star solution made from (476) Hedwig asteroidal occultation on Jul, 26th 2018.

(2258) Viipuri occultation: first Polish asteroid's satellite detection ?

In the case of the occultation of 4UC 378-171137 star by the asteroid (2258) Viipuri on **Sep 19, 2018**, we were dealing with a possibility of **re-discovery its small satellite**, with a diameter of 3-5 km.
The event duration was only 0.70s.

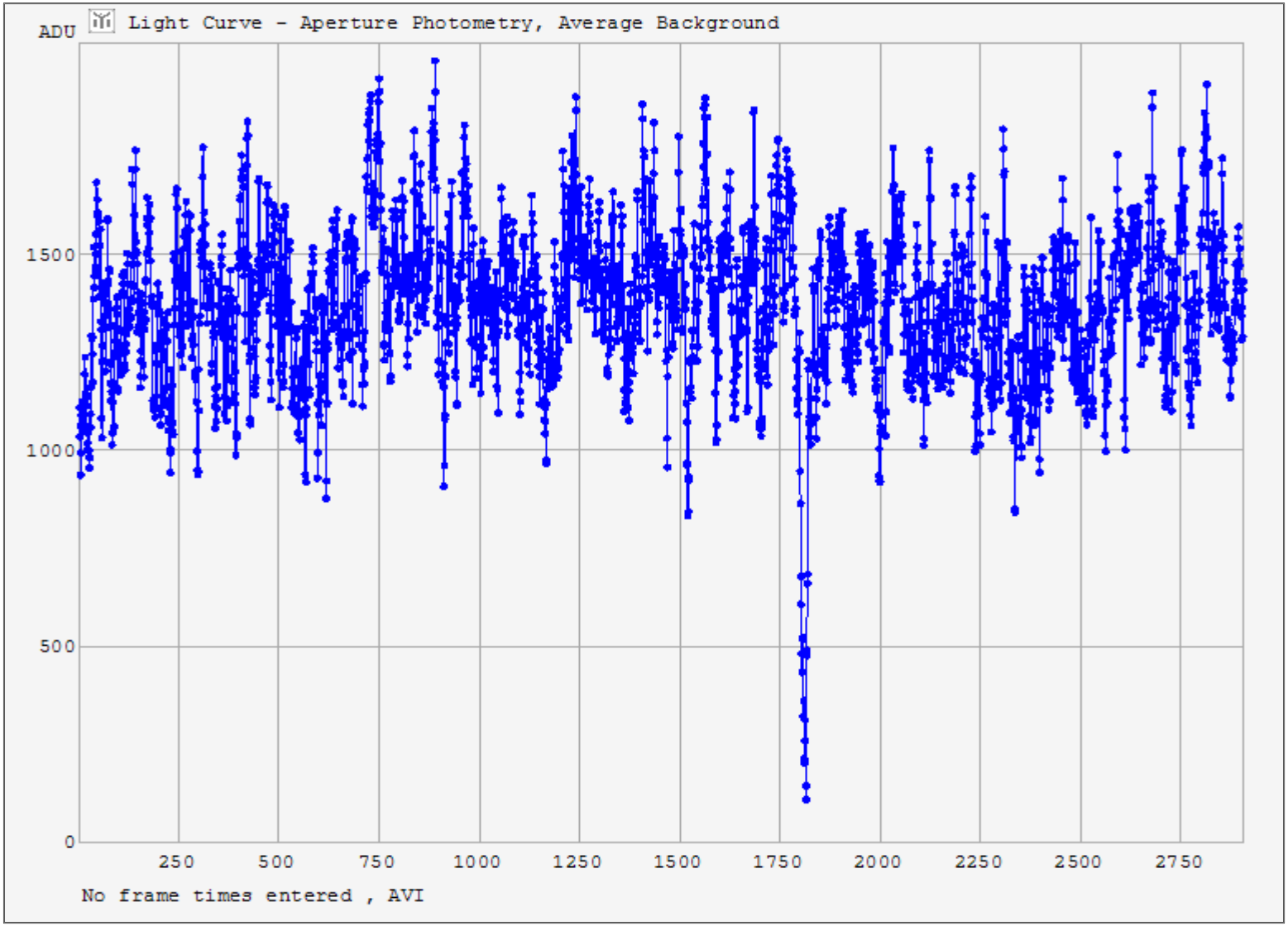
The event of a similar type, associated with (2258) Viipuri, was observed in the USA on August 3, 2013 by **Jerry Bardecker**.

It is not entirely possible to treat observation made by **Wojciech Burzyński** and **Maciej Jarmoc** as a confirmation of the existence of the asteroid's moon.

It is equally likely that asteroid (2258) Viipuri has occulted a **close double star with companions separation of 0.088”** ?

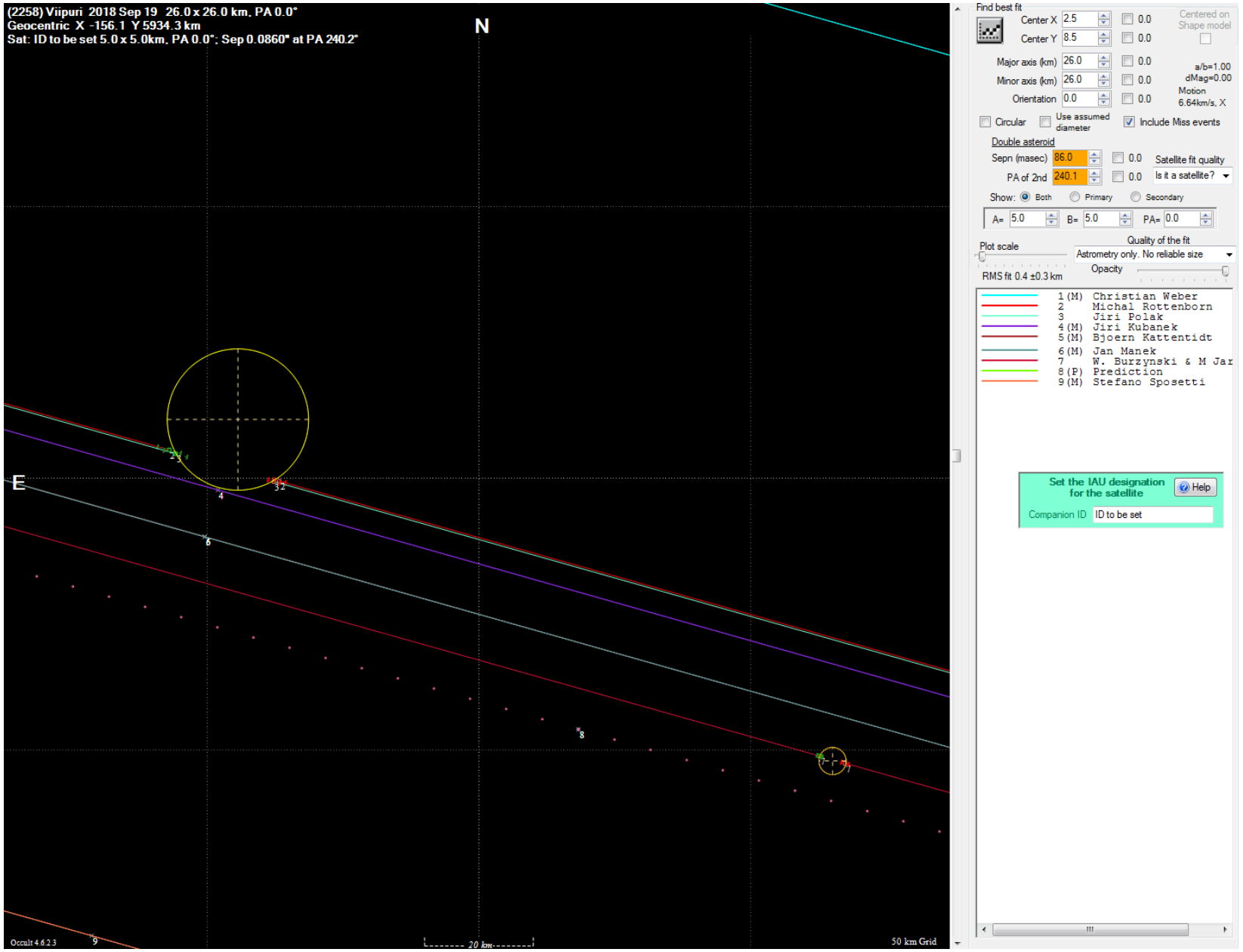
The investigation of this event's nature should be still in progress.

(2258) Viipuri occultation results



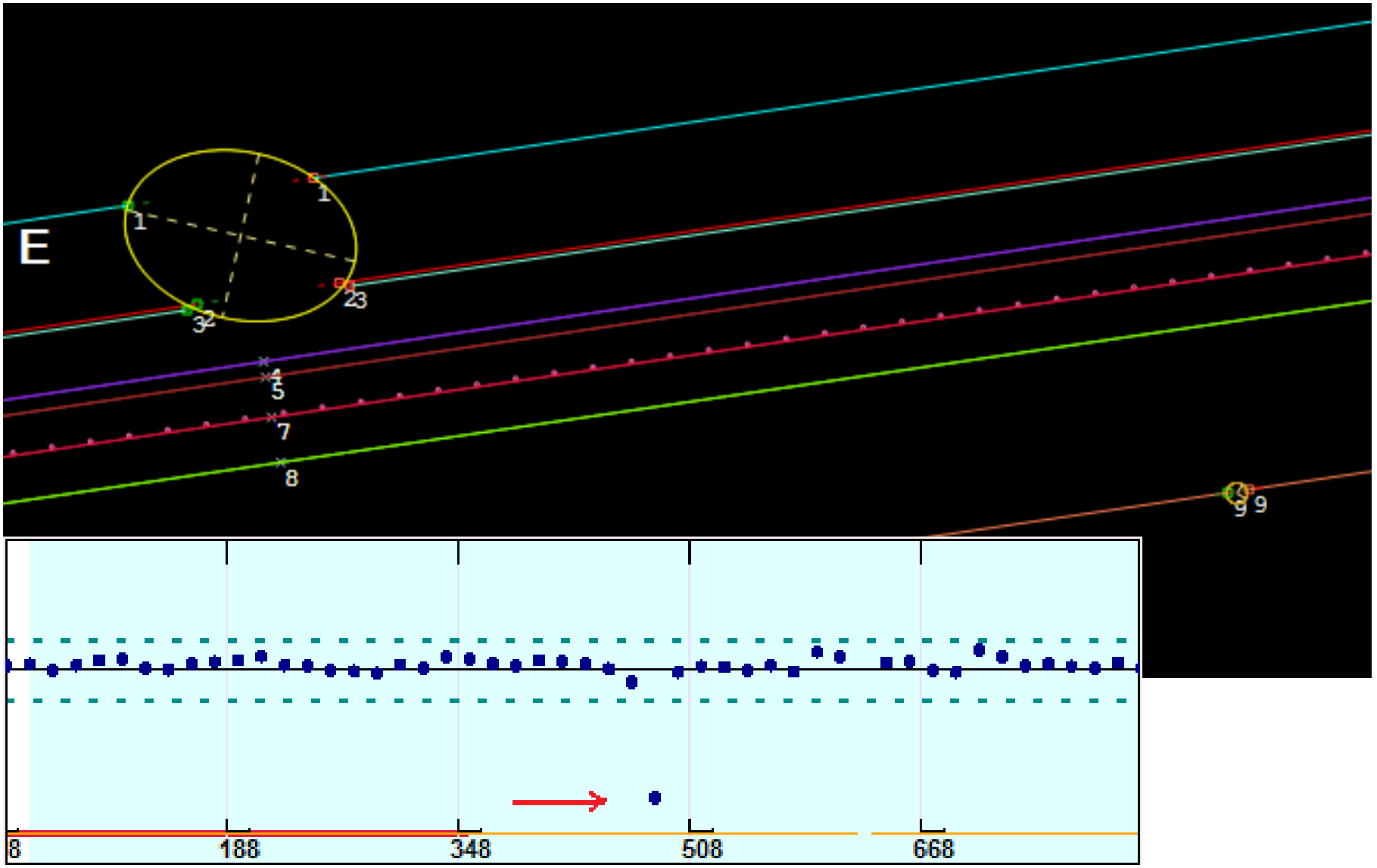
The LC recorded during (2258) Viipuri asteroidal occultation on Sep 19, 2018. Possible asteroid's satellite or a new double star detection.

(2258) Viipuri occultation results



(2258) Viipuri occultation 2013 - USA

(unfortunately) only single integrated frame event



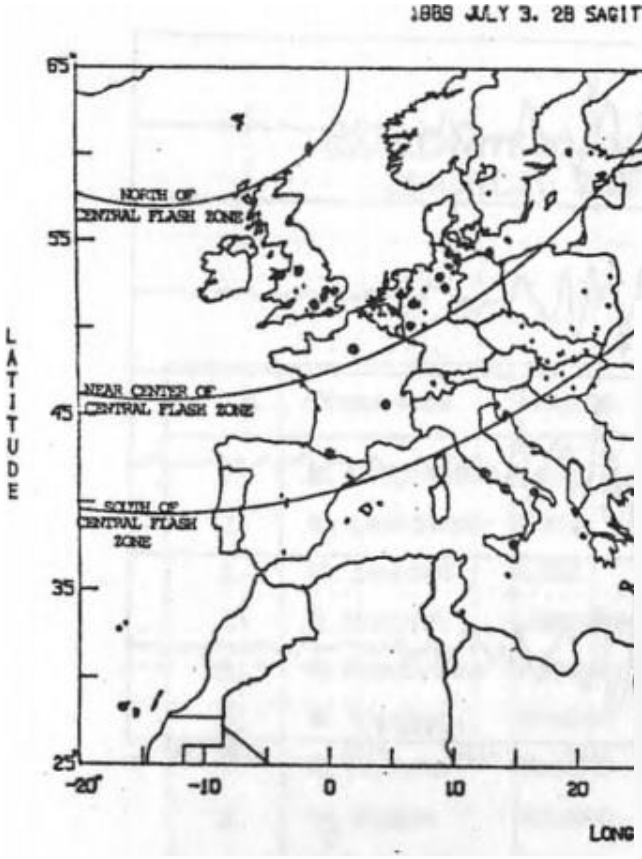
The Occultation Section of the PAAS

PLANETARY OCCULTATION

04 VII 1989 occultation of 28 Sgr by Titan

Observed in central and south-eastern Poland by 10 observers in total.

Central flash was recorded in Warsaw.



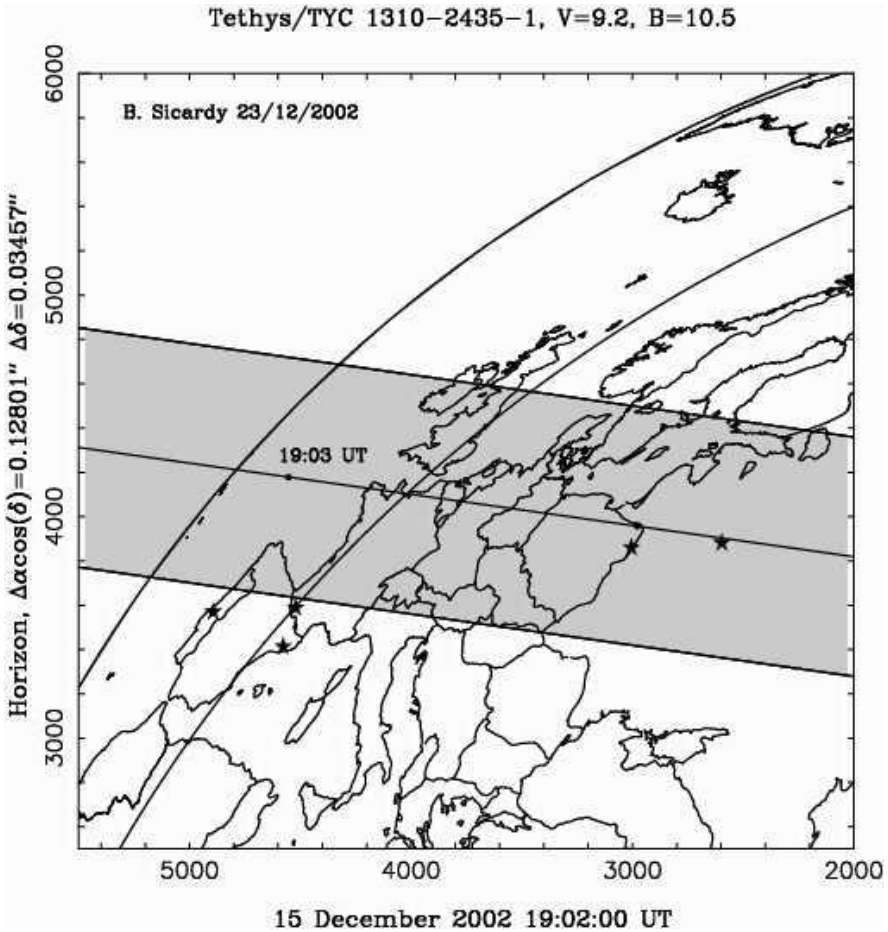
Wyniki obserwacji zakrycia gwiazdy 28 Sgr przez Tytana 1989 VII 3/4

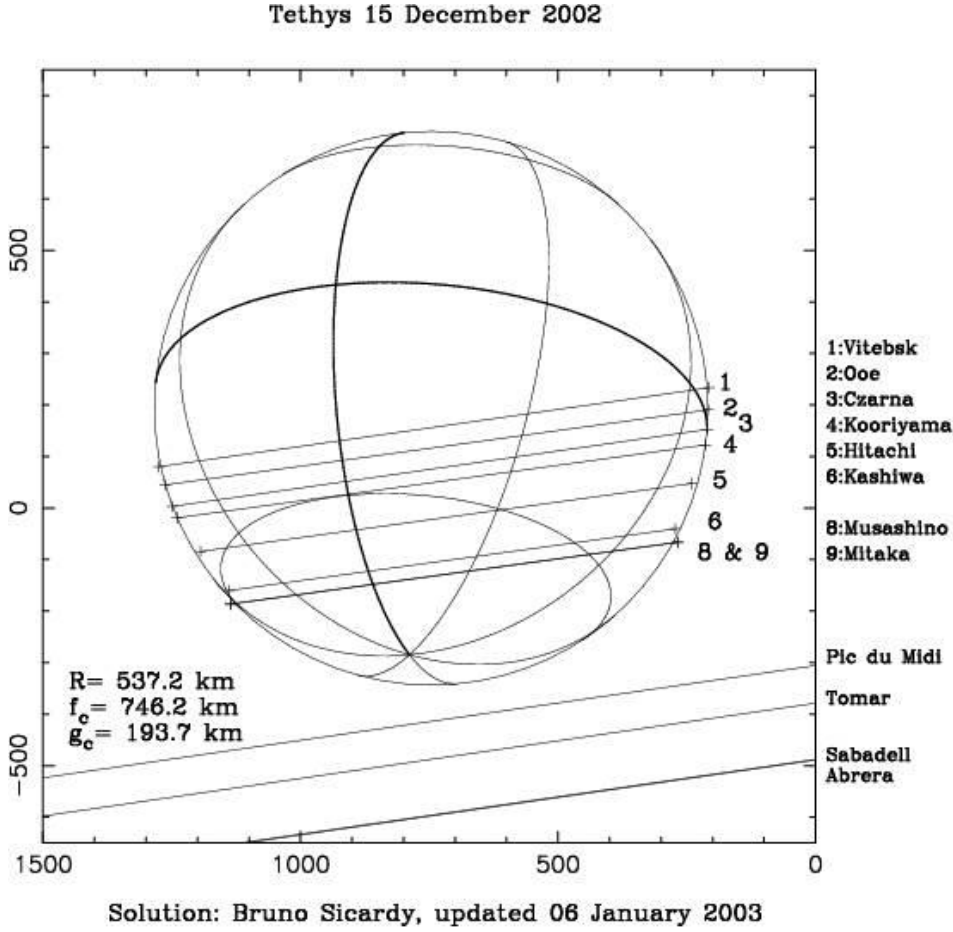
Miejsce obs.	Obserwator	Prz.opt.	Pow.	Sz.czasu.	Kontakty obserw. I	II	III	IV
1. Warszawa	R.Fangor	TN 250/1600	60 X	ERC	$22^h38^m15^s$	$22^h38^m21^s$	$22^h42^m55^s$	$22^h43^m38^s$
2. Warszawa	J.Wiland	R 64/400	30 X	ERC		22 38 07		22 43 24
3. Warszawa	L.Newelski	TN 250		ERC+STOP		22 38 40		
4. Warszawa	D.Miller	TN 150/1200		ERC+STOP		22 38 26	22 43 09	22 43 37
5. Kraków	J.Płeszka	R 80 / 1200	120X	STOP	22 39 20	22 39 29	22 43 37	22 43 46
6. Białystok	P.Chodorowski	R 64/800		MAGN	22 38 09	22 38 39	22 42 36	22 43 26
7. Krosno	J.Lubas	R 64/800	30 X	STOP	22 38 34	22 38 37	22 42 48	22 42 52
8. Krosno	G.Kiełtyka	R 81/1200	60 X	STOP	22 38 28		22 42 48	22 43 30
9. Rudna W.	W.Dziura	TN 121/853	53 X	STOP	22 38 22	22 38 28	22 43 12	22 43 18
10. Dąbrowa	M.Paradowski	TN 150/1350	108 X	MAGN	22 38 14	22 38 49	22 43 06	22 43 36

The Occultation Section of the PAAS

PLANETARY OCCULTATION

15 XII 2002 OCCULTATION OF PPM 94676 BY TETHYS - W. Burzynski (3)

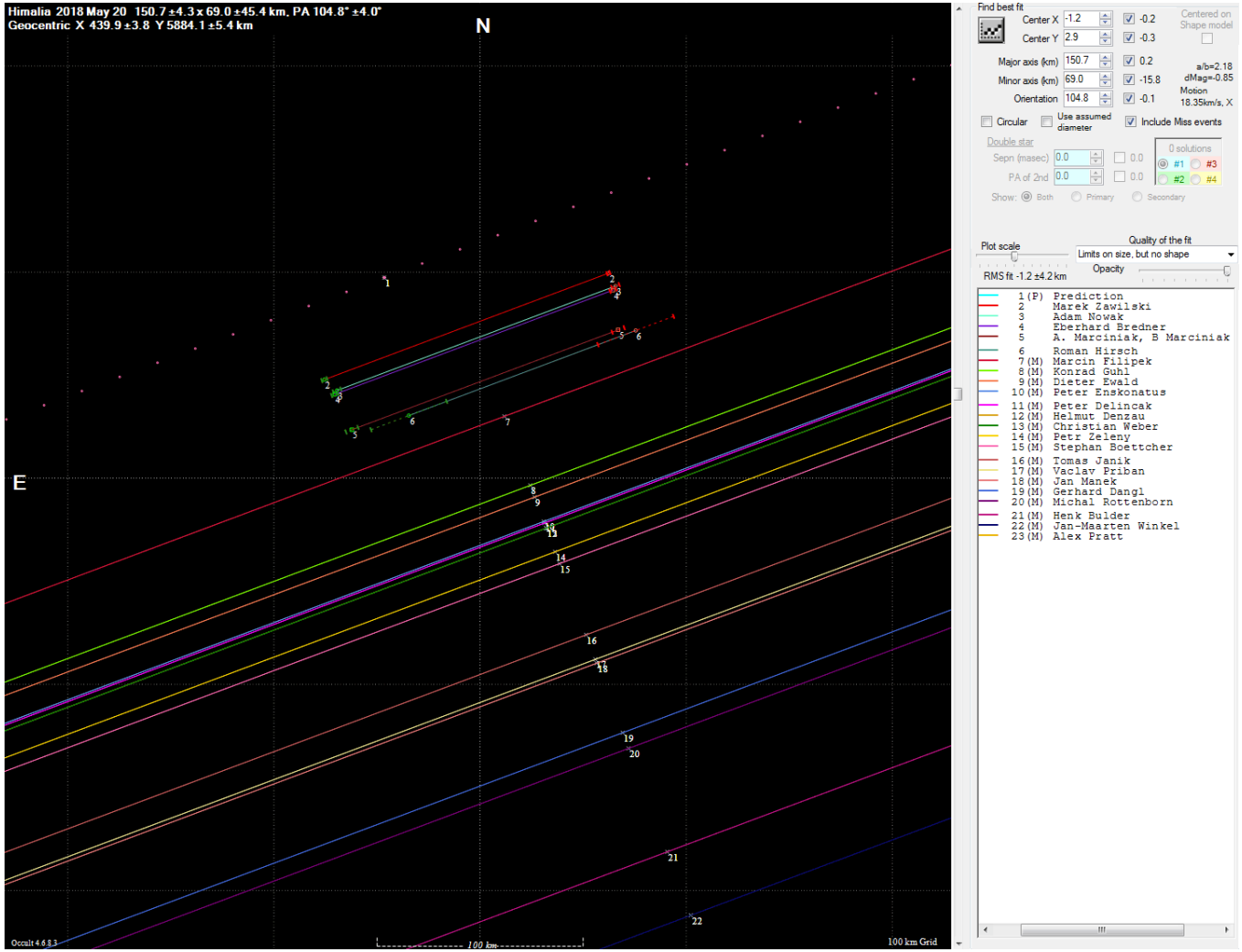




The Occultation Section of the PAAS

PLANETARY OCCULTATION

20 V 2018 TYC 6168-00860-1 occulted by Himalia, irregular jovian moon



Himalia occultation recorded at 5 stations:

- **E. Bredner**

- A. Marciniak
- R. Hirsch
- M. Zawilski
- A. Nowak

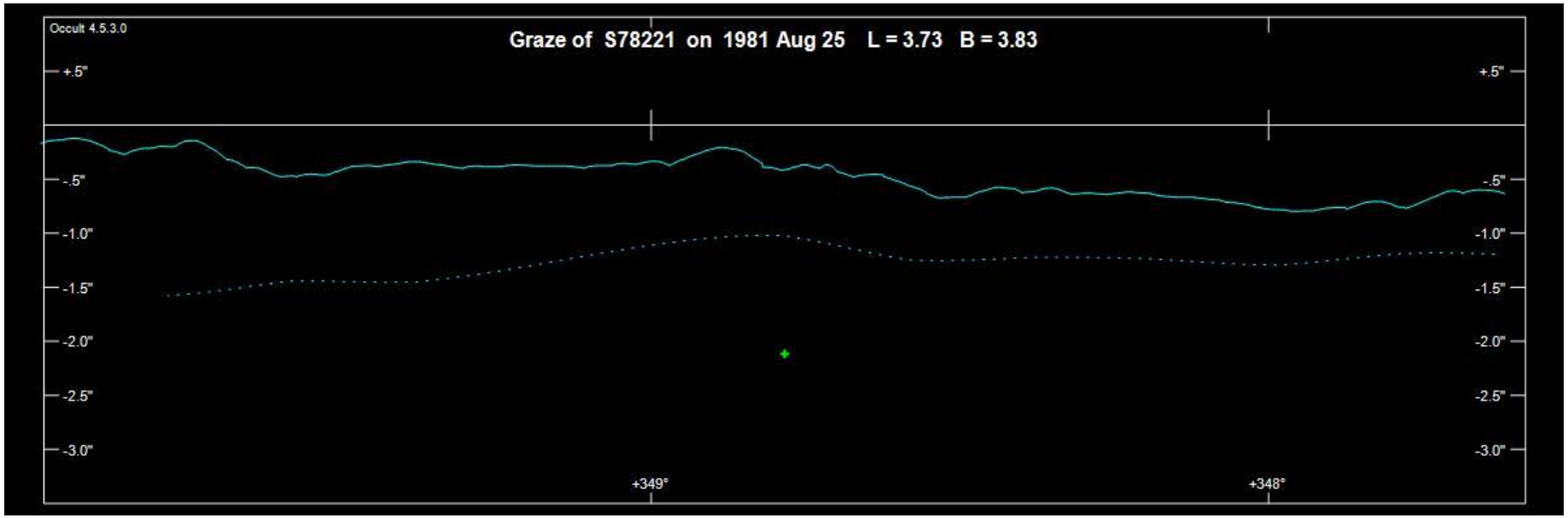
with unclear results.

The Occultation Section of the PAAS

GRAZING LUNAR OCCULTATION

25 VIII 1981 First grazing occultation result from single station observer (M. Szulc)

- **SAO 78221 (8.6 mag), CA = 7.7, MF: -23%**
- **1 event (RD), OC = -1.76”**
- **8-cm telescope, 7 km S from the graze limit line**



The Occultation Section of the PAAS

GRAZING LUNAR OCCULTATION

06 X 1984 First collective grazing occultation expedition with positive results

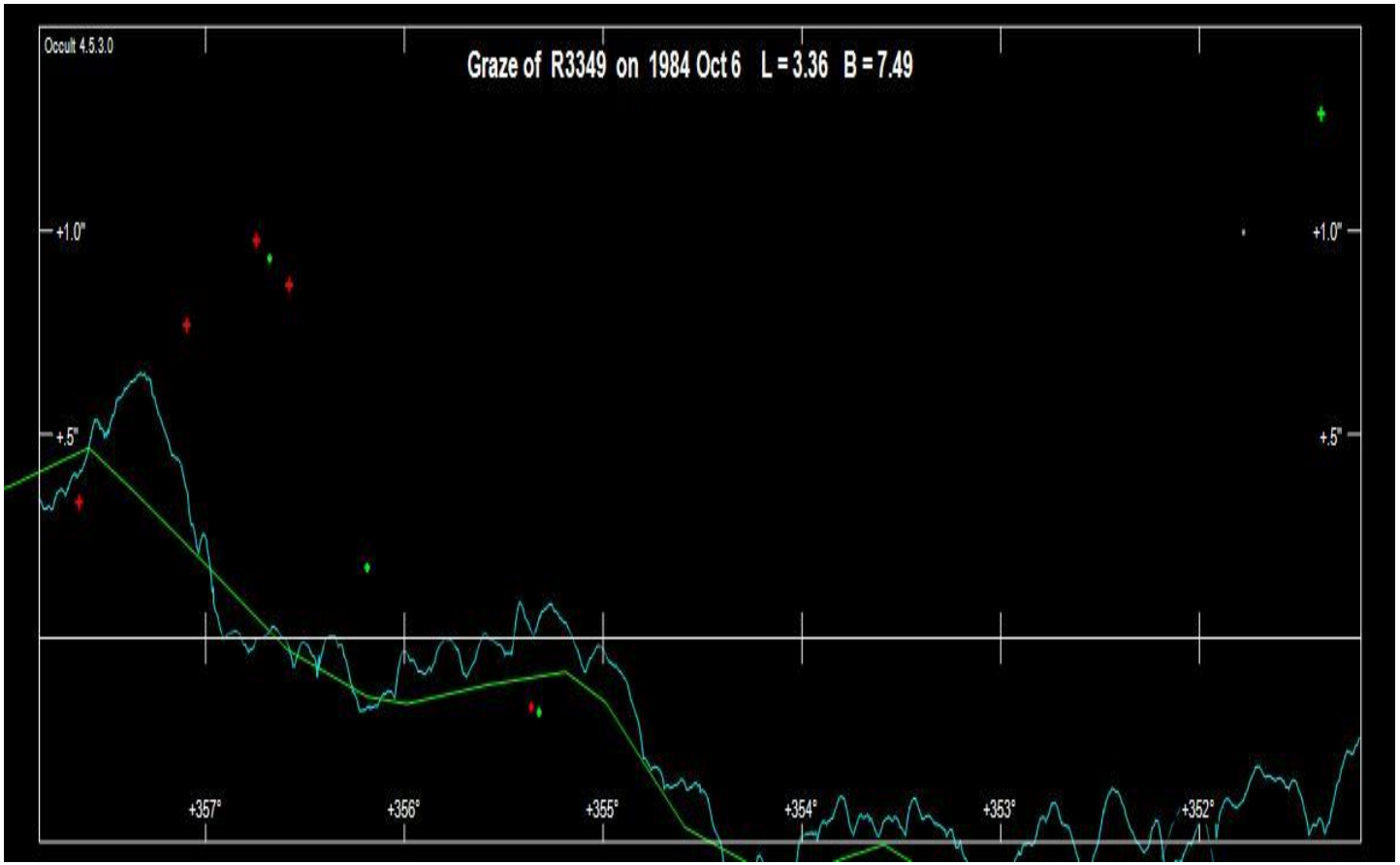
ZC 3349 (tau Aqu)
V = 4.0 mag

CA = 2.8 N,
MF = +91% !

4 observers
near Kowal,
central Poland

13 events recorded

Mean residual
0.095” +/- 0.260”



The Occultation Section of the PAAS

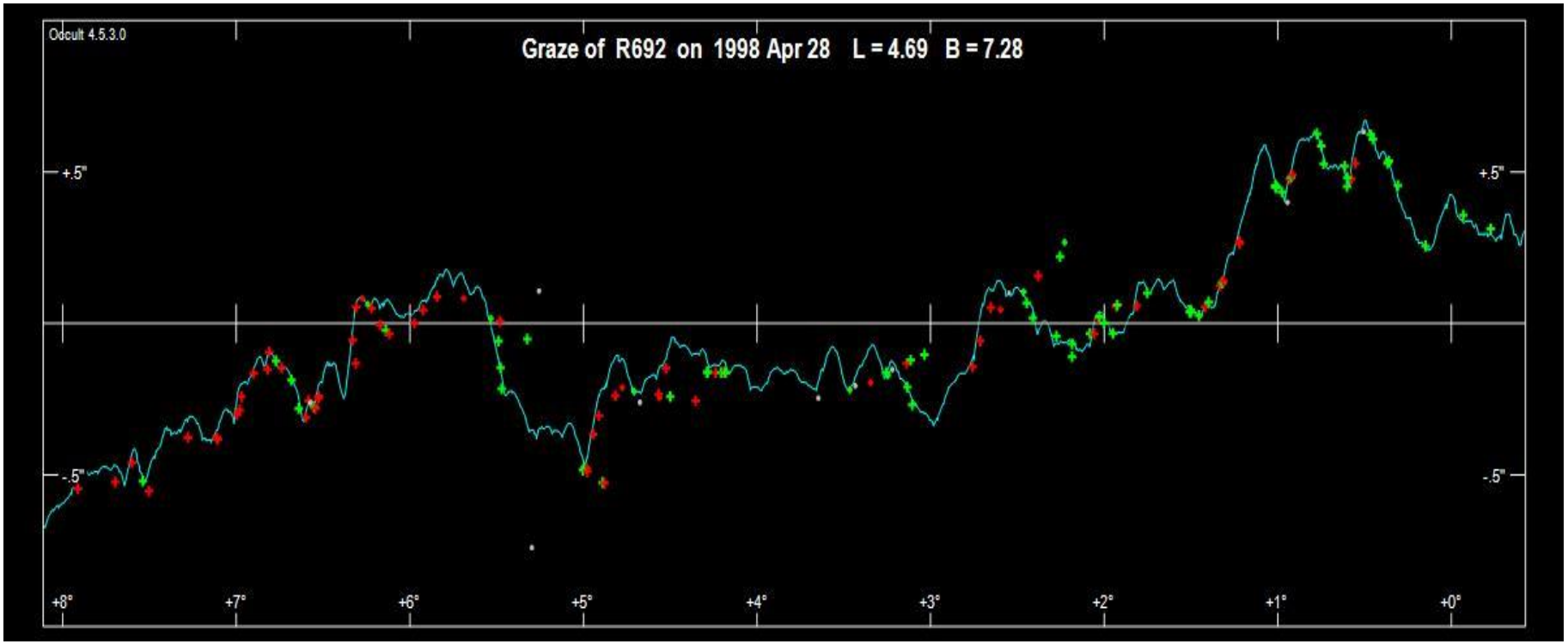
12 VIII 1990 Second collective grazing occultation expedition with positive results

- 10 stations near Gdansk-Jasien, N Poland
- 10 observers from Niepolomice Observatory had travelled **by Antonov PLANE !!!** over 560 km from Cracow-Balice airport !
- **42 events recorded in total**

The Occultation Section of the PAAS

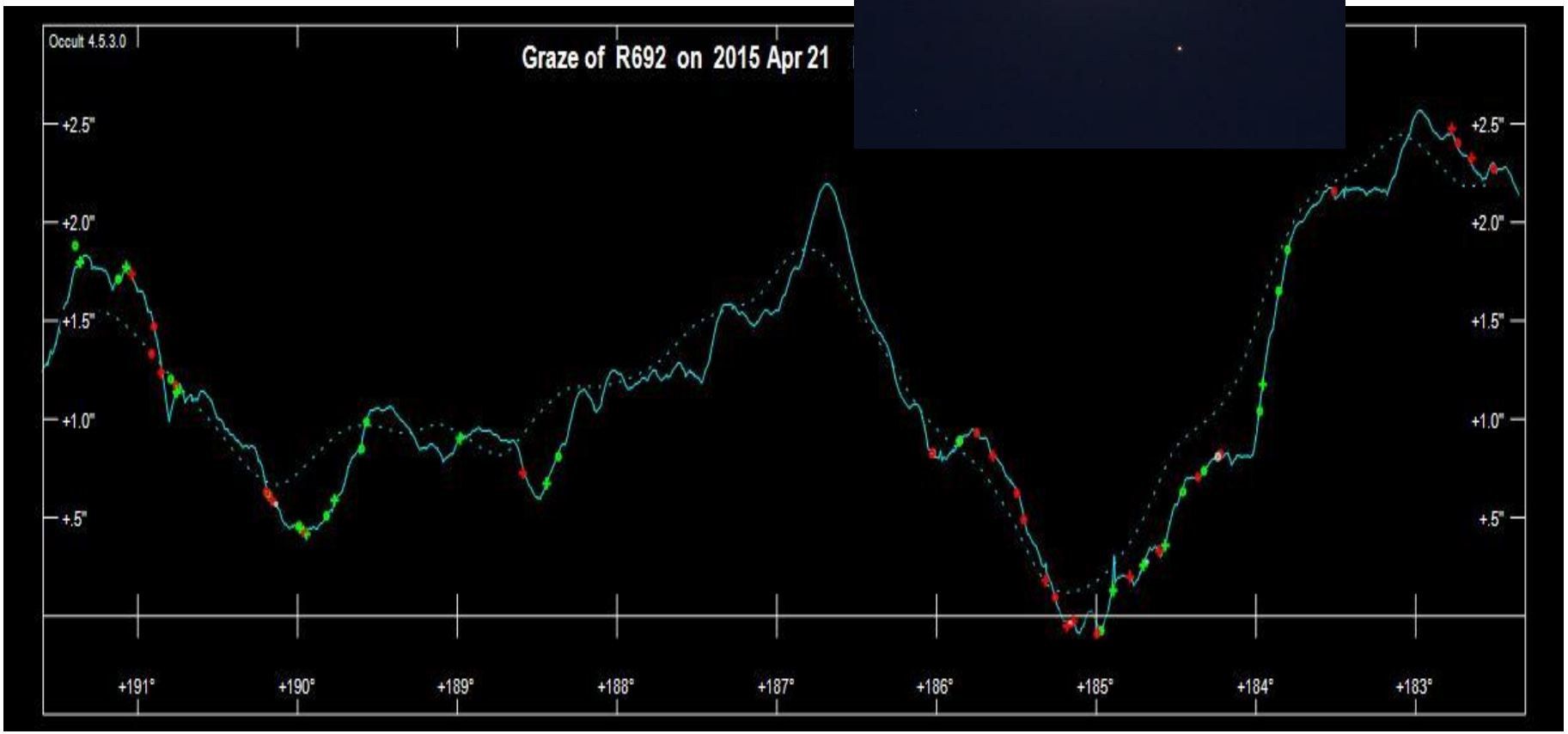
28.04.1998 **The greatest grazing occultation expedition in Poland ever (Aldebaran)**

- 29 stations near Łódź, central Poland
- 42 observers (9 were from Czech Republic and Slovakia)
- **140 events recorded !**
- mean residual of events: - 0.019" ± 0.098"

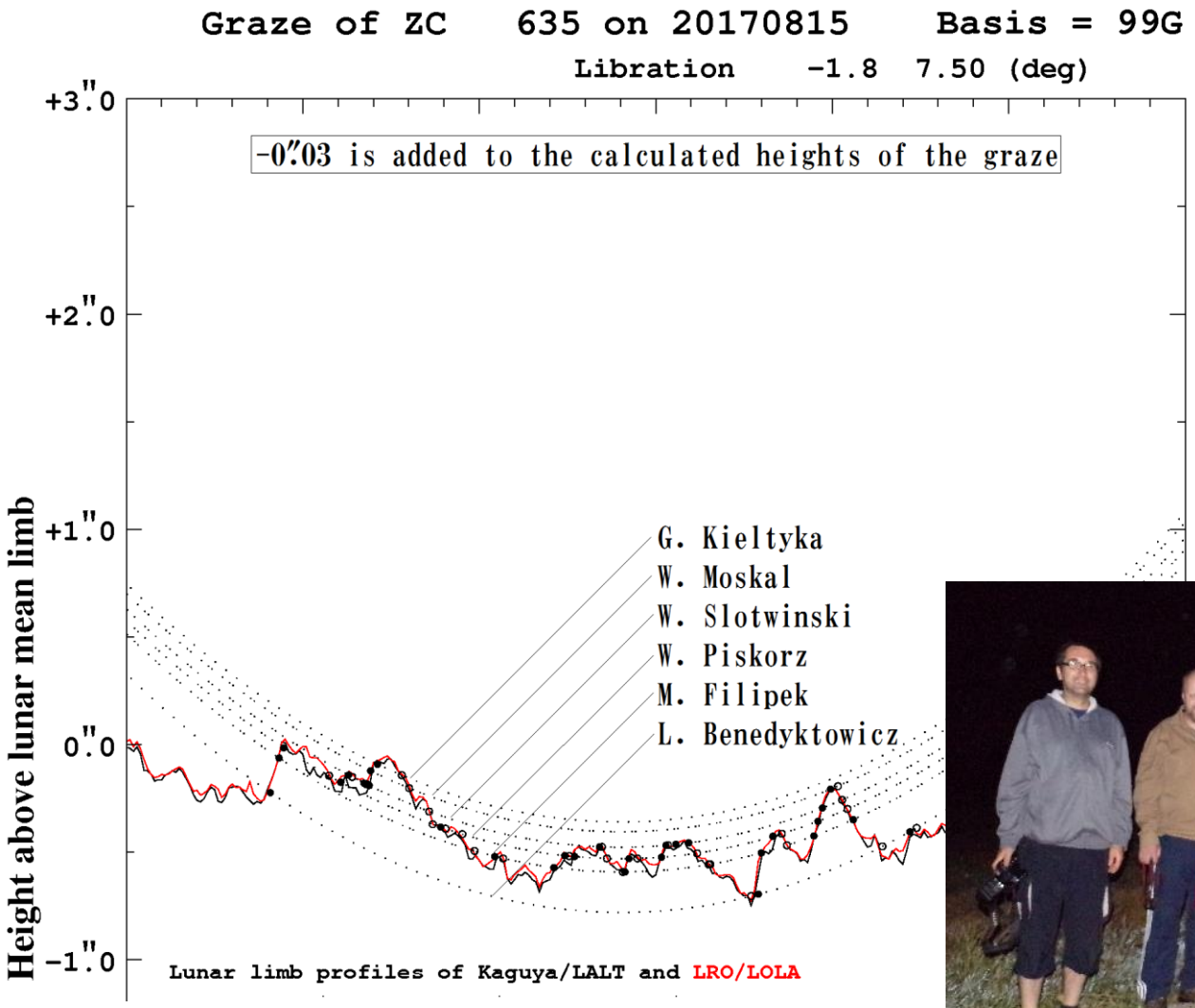


The latest collective activity – Aldebaran grazing occultation, April 21, 2015

- Nowinka, NE Poland
- 8 observers
- 64 events
- mean residual of events: - 0.006" ± 0.045"



The latest collective activity – lunar grazing occultation on Aug 15, 2017



- 6 observers
- 58 events

- mean residual of events: 0.007" ± 0.039"

Grazing lunar occultations expeditions results 1990 -1999

YEAR	TOTAL	NEGATIVE	POSITIVE	REMARKS
1990	2	-	2	10 observers had travelled over 500 km by Antonov plane !
1991	2	-	2	
1992	5	2	3	
1993	3	-	3	
1994	1	1	-	
1995	4	1	3	
1996	2	1	1	
1997	3	-	3	
1998	15	9	6	Aldebaran - „great" international graze expedition near Łódź – 42 obs. / 140 events
1999	13	10	3	

** NEGATIVE results: cloudiness or equipment failure*

Grazing lunar occultations expeditions results 2000 - 2009

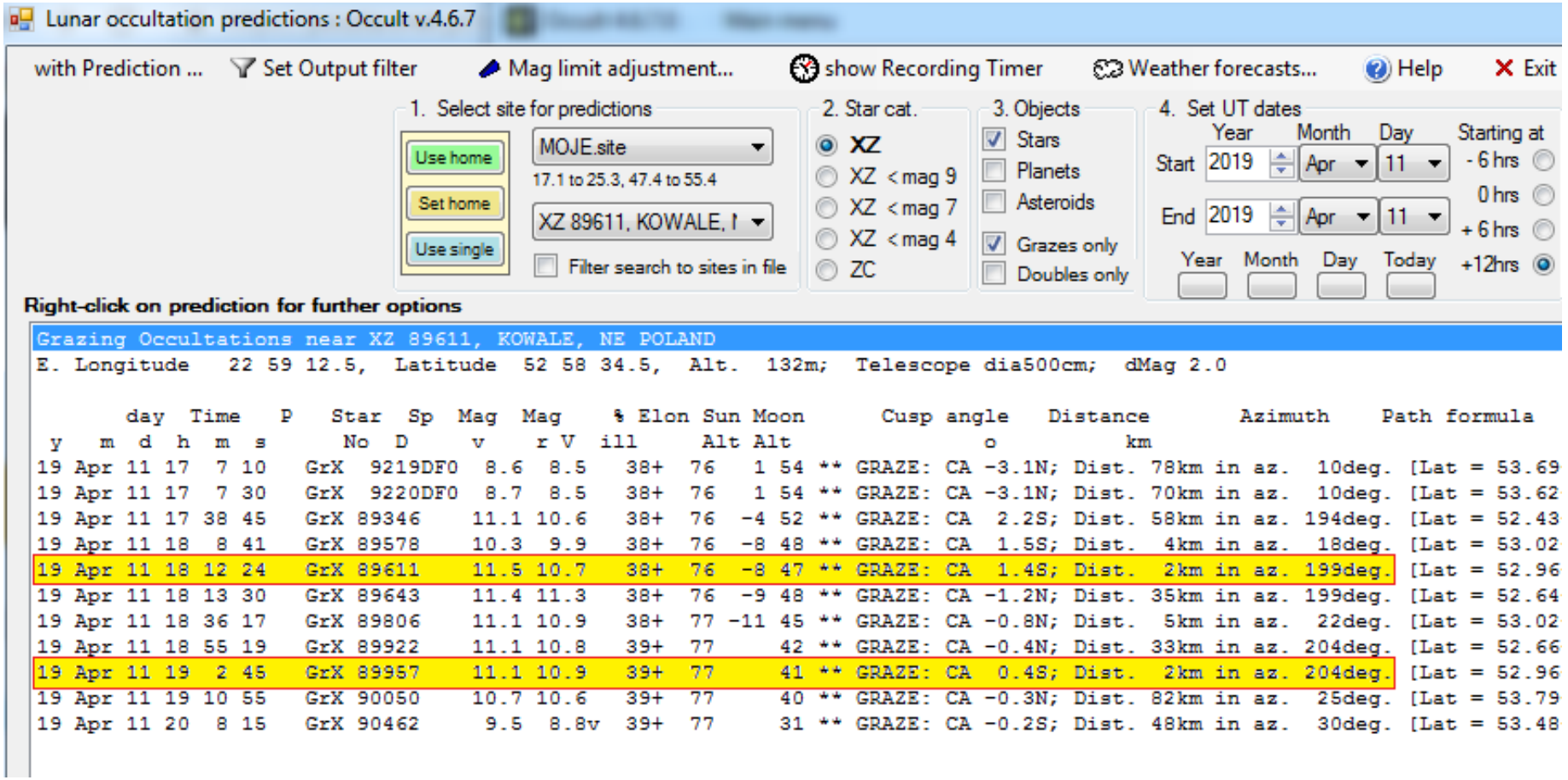
YEAR	TOTAL	NEGATIVE	POSITIVE	REMARKS
2000	18	8	10	best year ever !
2001	11	7	4	
2002	13	5	8	
2003	10	3	7	
2004	1	-	1	
2005	3	-	3	
2006	4	-	4	
2007	8	2	6	
2008	2	-	2	
2009	-	-	-	

** NEGATIVE results: cloudiness or equipment failure*

Grazing lunar occultations expeditions results 2010-2019

YEAR	TOTAL	NEGATIVE	POSITIVE	REMARKS
2010	3	1	2	
2011	-	-	1	
2012	-	-	-	
2013	-	-	-	
2014	-	-	-	
2015	2	-	2	
2016	1	1	-	
2017	3	-	3	3 of 33 raported to M. Soma from Poland
2018	8	1	7	7 of 31 raported to M. Soma from Poland
2019	7 …	3 …	4 …	World Record faintest graze ? (11.46 mag ?) **4 of 7 raported to M. Soma from Poland**
TOTAL	**162**	**62**	**110**	

Graze of XZ 89611, 11.46 mag, on Apr 11, 2019

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Grazing Occultations near XZ 89611, KOWALE, NE POLAND
E. Longitude   22 59 12.5,  Latitude  52 58 34.5,  Alt.  132m;  Telescope dia500cm;  dMag 2.0

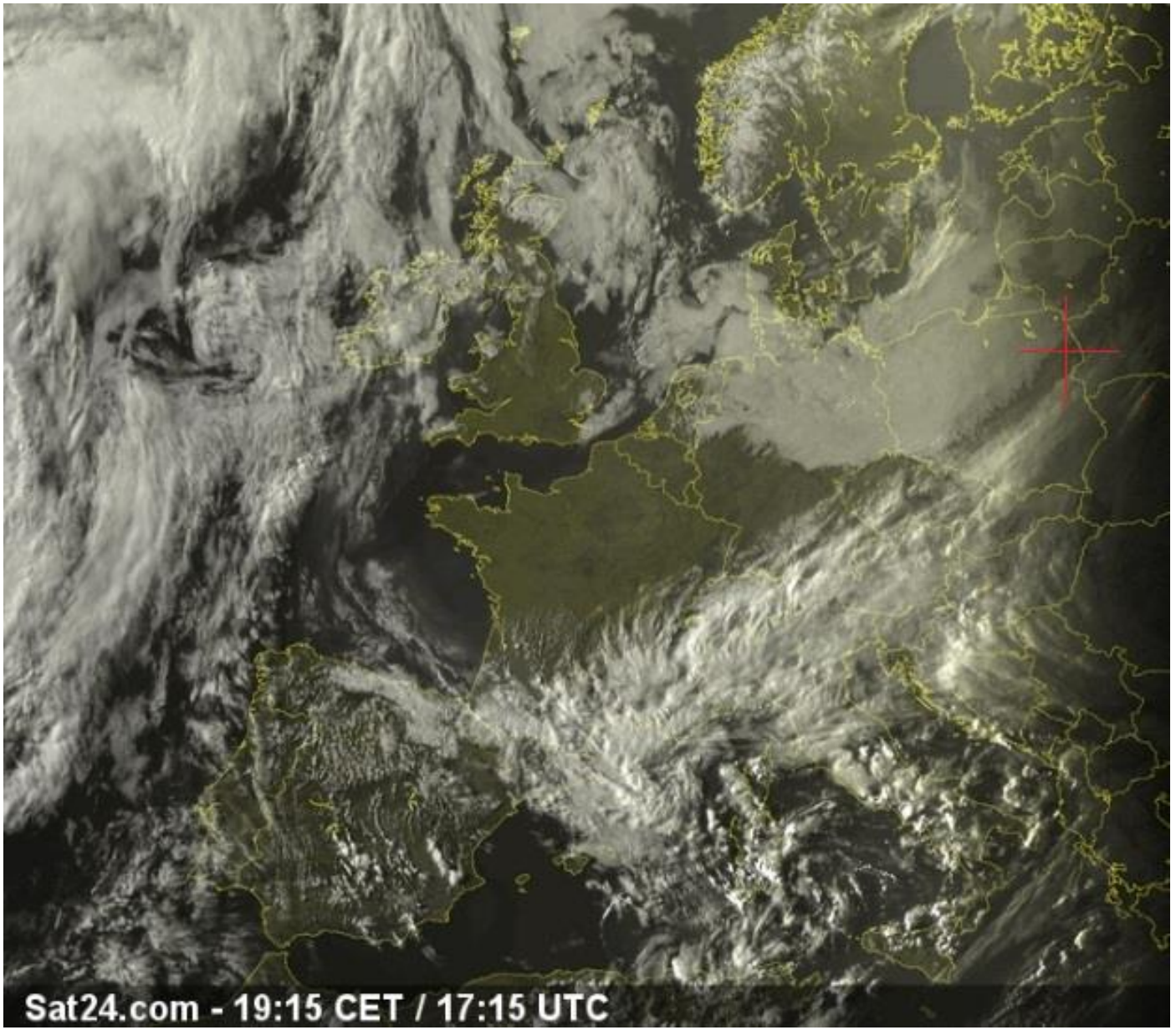
       day  Time    P   Star  Sp  Mag  Mag     % Elon Sun Moon      Cusp angle   Distance       Azimuth    Path formula
 y   m  d  h  m  s      No  D     v    r V  ill     Alt Alt                o          km
19 Apr 11 17  7 10   GrX  9219DF0  8.6  8.5   38+  76   1 54 ** GRAZE: CA -3.1N; Dist. 78km in az.  10deg. [Lat = 53.69
19 Apr 11 17  7 30   GrX  9220DF0  8.7  8.5   38+  76   1 54 ** GRAZE: CA -3.1N; Dist. 70km in az.  10deg. [Lat = 53.62
19 Apr 11 17 38 45   GrX 89346    11.1 10.6   38+  76  -4 52 ** GRAZE: CA  2.2S; Dist. 58km in az. 194deg. [Lat = 52.43
19 Apr 11 18  8 41   GrX 89578    10.3  9.9   38+  76  -8 48 ** GRAZE: CA  1.5S; Dist.  4km in az.  18deg. [Lat = 53.02
19 Apr 11 18 12 24   GrX 89611    11.5 10.7   38+  76  -8 47 ** GRAZE: CA  1.4S; Dist.  2km in az. 199deg. [Lat = 52.96
19 Apr 11 18 13 30   GrX 89643    11.4 11.3   38+  76  -9 48 ** GRAZE: CA -1.2N; Dist. 35km in az. 199deg. [Lat = 52.64
19 Apr 11 18 36 17   GrX 89806    11.1 10.9   38+  77 -11 45 ** GRAZE: CA -0.8N; Dist.  5km in az.  22deg. [Lat = 53.02
19 Apr 11 18 55 19   GrX 89922    11.1 10.8   39+  77     42 ** GRAZE: CA -0.4N; Dist. 33km in az. 204deg. [Lat = 52.66
19 Apr 11 19  2 45   GrX 89957    11.1 10.9   39+  77     41 ** GRAZE: CA  0.4S; Dist.  2km in az. 204deg. [Lat = 52.96
19 Apr 11 19 10 55   GrX 90050    10.7 10.6   39+  77     40 ** GRAZE: CA -0.3N; Dist. 82km in az.  25deg. [Lat = 53.79
19 Apr 11 20  8 15   GrX 90462     9.5  8.8v  39+  77     31 ** GRAZE: CA -0.2S; Dist. 48km in az.  30deg. [Lat = 53.48
```

Occult's settings :

- set maximal allowed telescope diameter (500 cm)
- set dMag correction factor as „+2"
- set chosen searching radius, e.g. 50 km

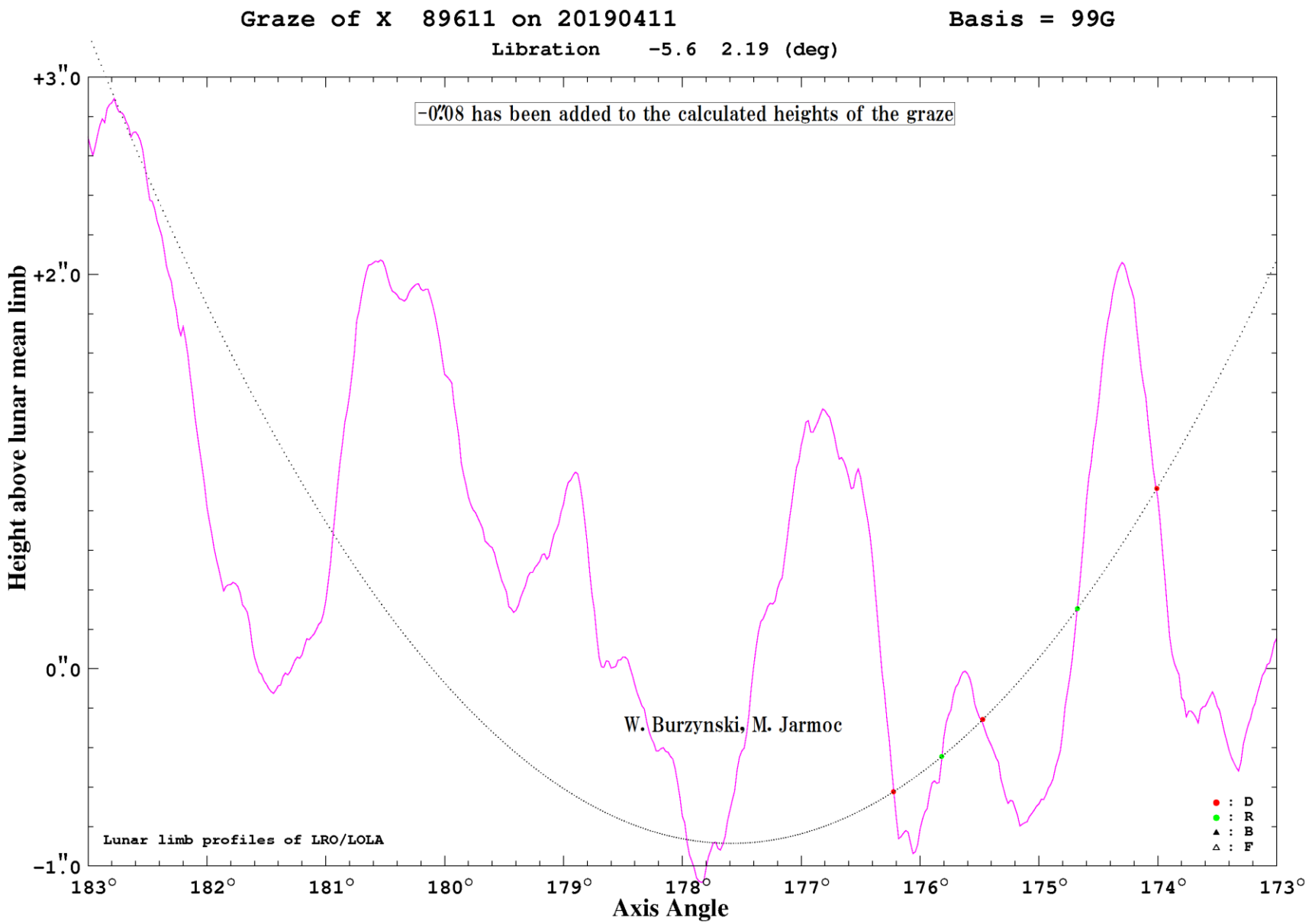
Graze of XZ 89611 – the faintest world graze ?

Graze of XZ 89611 – the faintest world graze ?



Graze of XZ 89611 – the faintest world graze ?

Graze of XZ 89611 – the faintest world graze ?



Graze of XZ 89611 – the faintest world graze ?

Cat ID	Magnitudes B	V	R
GaiaSrc3373081363674203904	11.5	9.9	8.8
GaiaSrc3373081398030251008	...	15.9	...
Source 3373081363674203904	...	...	...
GaiaSrc3373081359375614208	...	9.8	...
UCAC5 3373081359375614208	...	10.6	9.8
HSOY 3220289696799864485	...	9.8	9.6
UCAC4 556-030192	...	11.2	12.0
TYC 1341-522-1	...	11.6	...
URAT1 556-110212	13.0	11.2	10.5
3UC 223-065270	...	10.6	8.9
2UCAC 39291182	...	10.6	...
PPMXL 3220289696799864485	...	...	9.6
PPMX 063308.3+211049	...	11.4	10.6
CMC15 063308.3+211049	...	...	10.5
2MASS 06330830+2110496	...	...	11.5
USNO-B1.0 1111-0128689	...	...	10.7
NOMAD1 1111-0131404	...	11.5	10.6
CMC14 063308.3+211049	...	...	10.5

According to knowledge I have, both events can be treat **unoficially** as new "world record" of the faintest lunar grazing occultation.

PREVIOUSLY:
XZ 75176
(10.81 mag)
on 16 VIII 2009
by Jan Manek

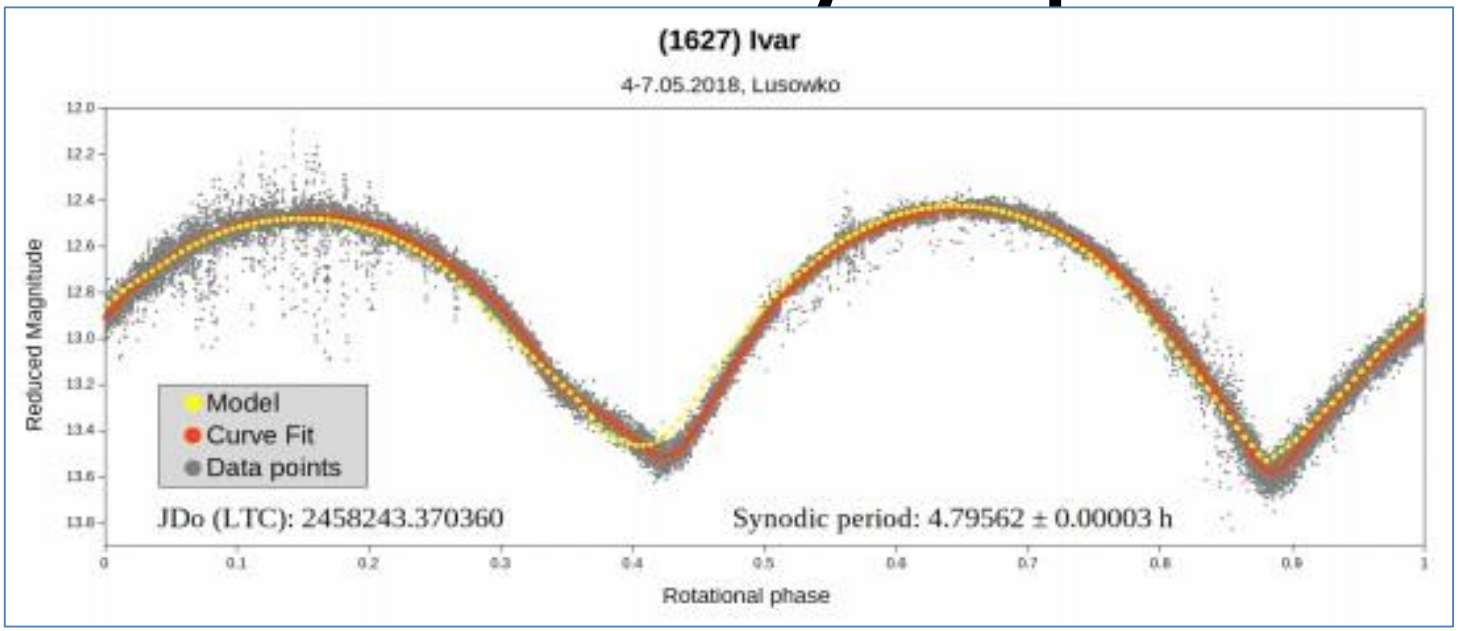
Was it a **WORLD RECORD** or not ?

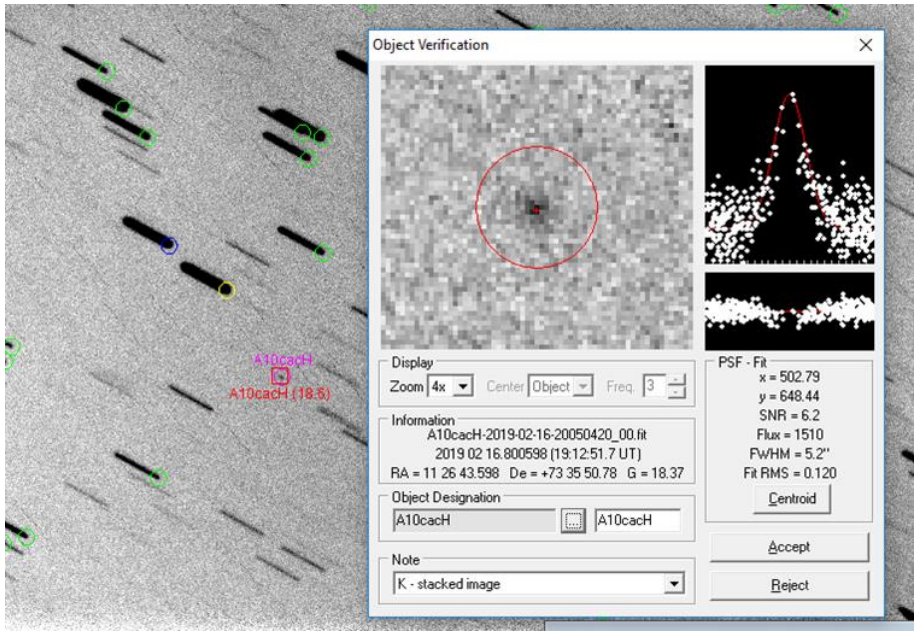
Full description: http://www.sopiz.ptma.pl/rekordowe-zakrycia-brzegowe-11-kwietnia-2019/

Grazing occultation of XZ 89957 – 11.1 mag

The last attempt to beat WR on Aug 27, 2019

Asteroid astrometry and photometry

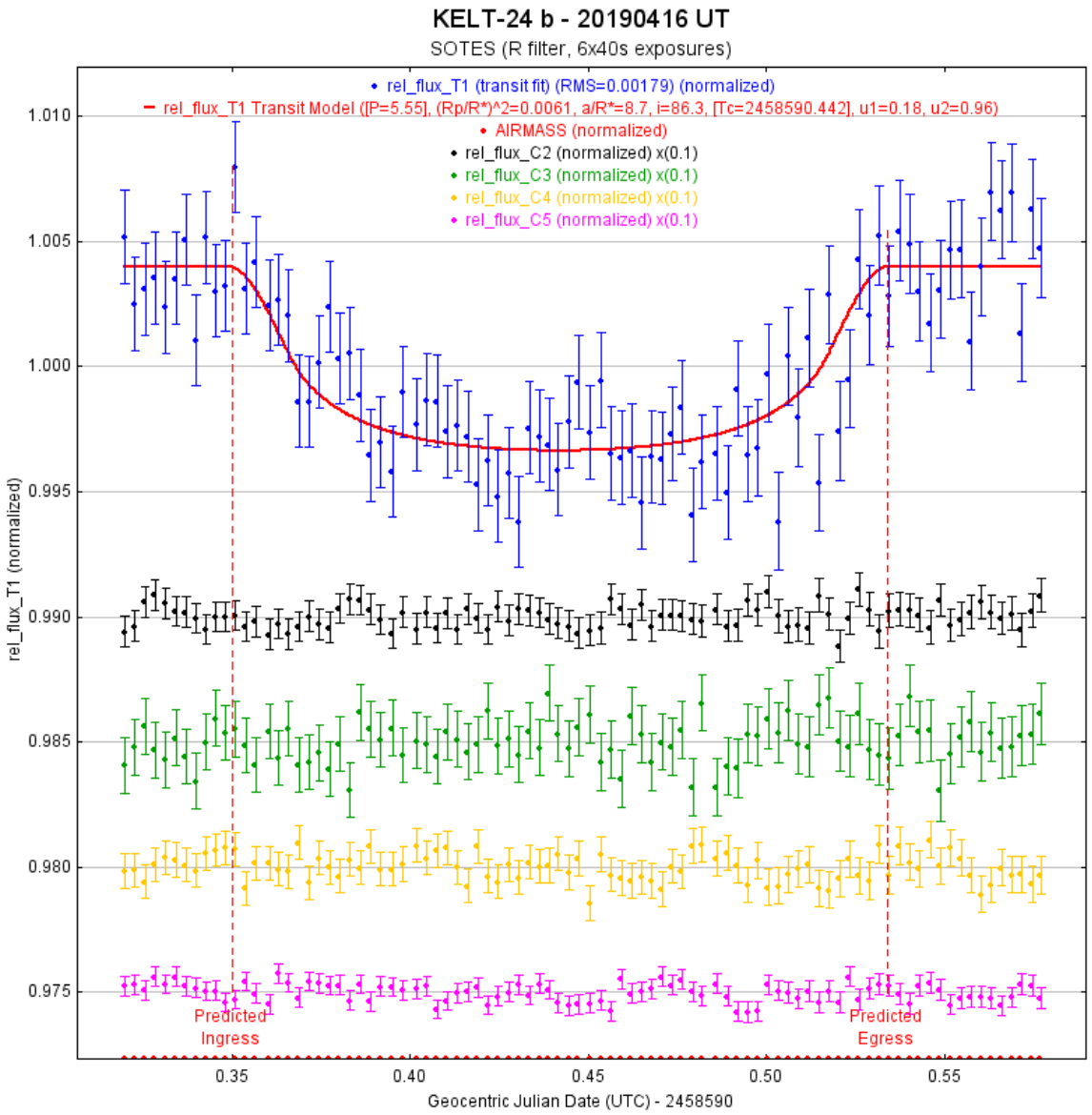




Tomasz Kluwak's observations

Lusowko Platanus Observatory
(near Poznan)
IAU code: K80

Exoplanets co-discoveries



KELT-24 b

This is the third co-discovered exoplanet by **Gabriel Murawski**

magnitude drop: 0.007

Please follow at:

https://www.facebook.com/ObserwatoriumSOTES/

Present state of Occultation Section of the PAAS

- **ca.10 active observers** for 2018/2019,

  5 others occasionally

- after the formal and unformal management of the Section for over 30 years…..**Marek Zawilski** delegated his duties as the Section co-ordinator to **Wojciech Burzyński**
  – April 27, 2019

- Section headquarter moved, after over 30 years, from Łódź to Białystok
  – April 27, 2019.

Members distribution

Present state of Occultation Section of the PAAS

Group photo taken during XXIX Conference of SOPiZ PTMA - April 27-28, 2019, Warsaw

Near future

- XXX Conference of SOPiZ PTMA in Poznań, western Poland, May 2020
- switching observer's equipment to „full-digital" ASAP
- multi station (pre-point) methode implementation
- resumption of astromeric observations by more members
- popularizing occultation observations in social media – YT canal, FB fanpage
- closer cooperation with professionals – Poznań Astronomical Observatory
- starting co-operation with Lithuanian and Belarussian amateurs in occultation job
- Section headquarter in new-build University of Białystok Astronomical Observatory ?
- XL ESOP in Poland – Białystok , 27 VIII – 1 IX 2021

XL ESOP in Poland – Białystok

27 VIII – 1 IX 2021

Campus of the University of Białystok - Physics Faculty

XL ESOP in Poland – Białystok

27 VIII – 1 IX 2021

Campus of the University of Białystok – Astronomical Observatory under construction since May, 2019

Section headquarter in new-build University of Białystok Astronomical Observatory ?
Photo taken on Aug 25, 2019

Thank you for your attention !
Any questions ?