



Videoastronomie mit Smart Teleskopen?

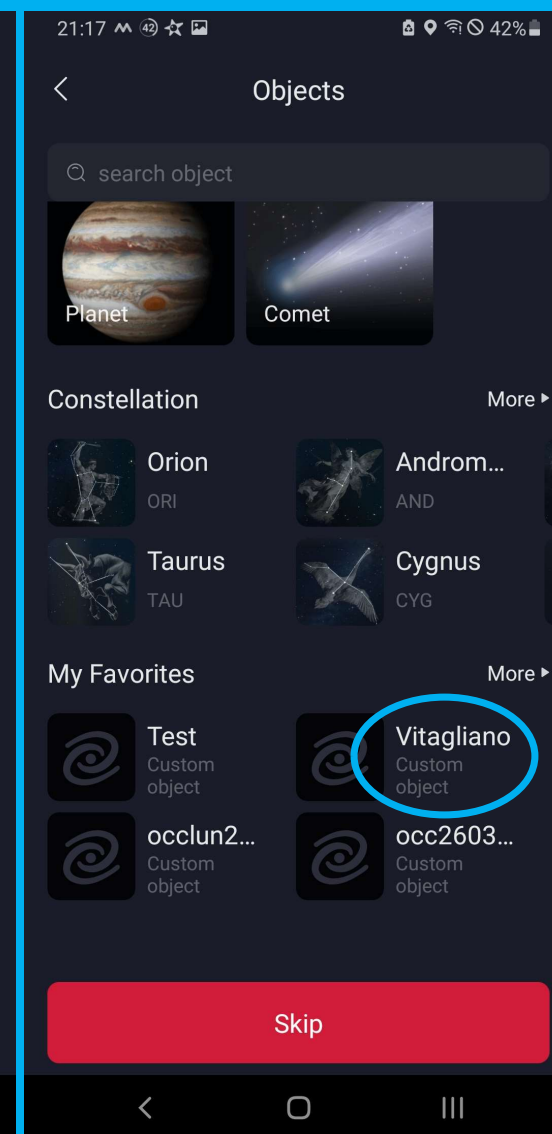
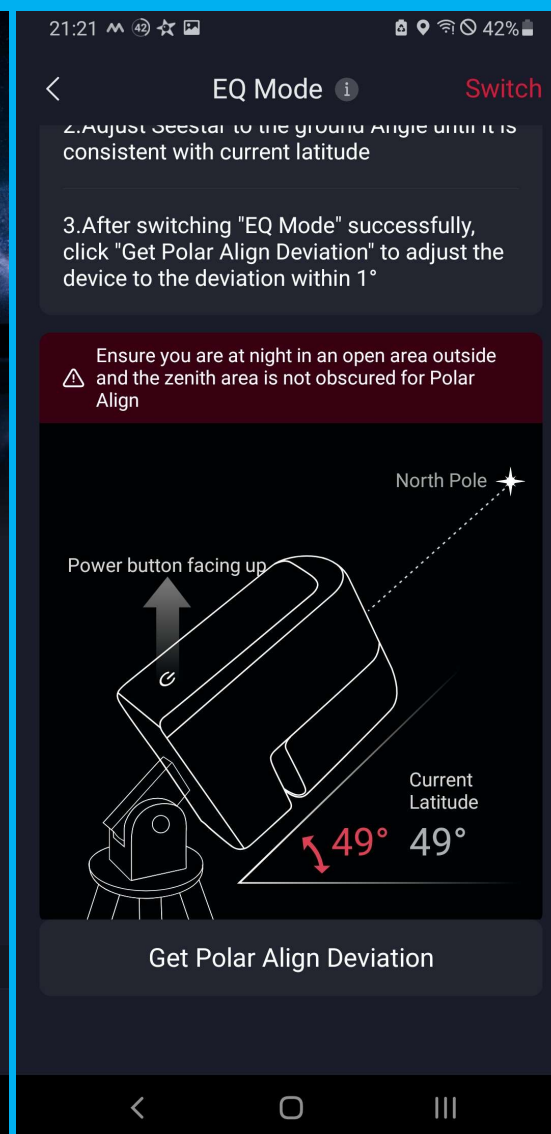
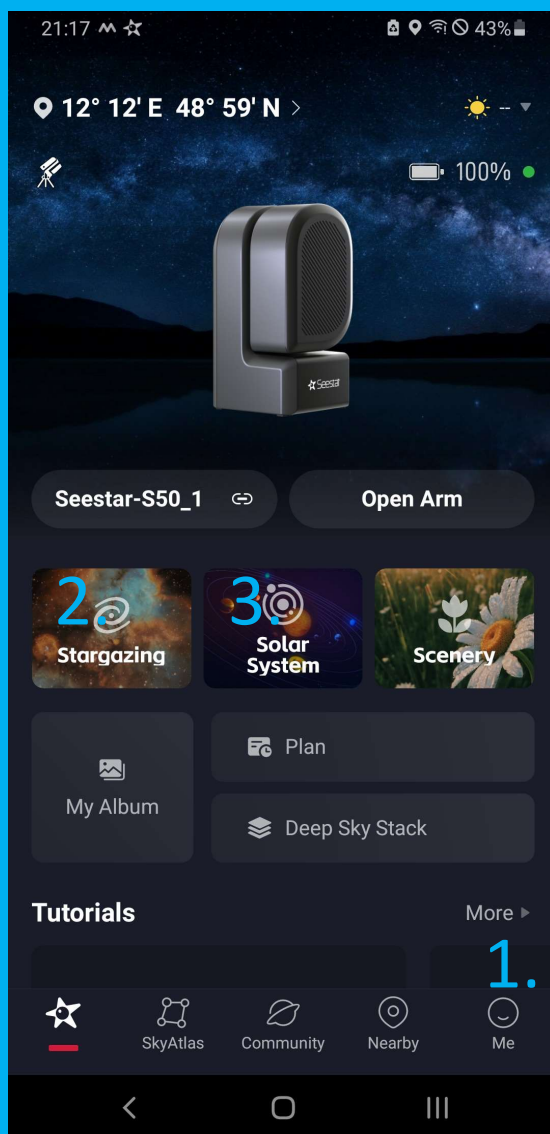
Björn Kattentidt
28. Kleinplanetentagung
Salzburg, Österreich
20./21. Juni 2026



Seestar S50

**Beobachtung der Sternbedeckung von
(5368) Vitagliano
am 12.03.2026 mit Bernd Gährken
nördlich Regensburg**

- Video mit Seestar app
- Zeitstempel?? 1pps Blitzer
- Filter Occult Watcher
- Signal-Rausch-Verhältnis?
- Magnituden des S50 bei Video
- Ereignis Filterung mit Excel
- DAMIT / ISAM
- Expedition
- Ergebnisse



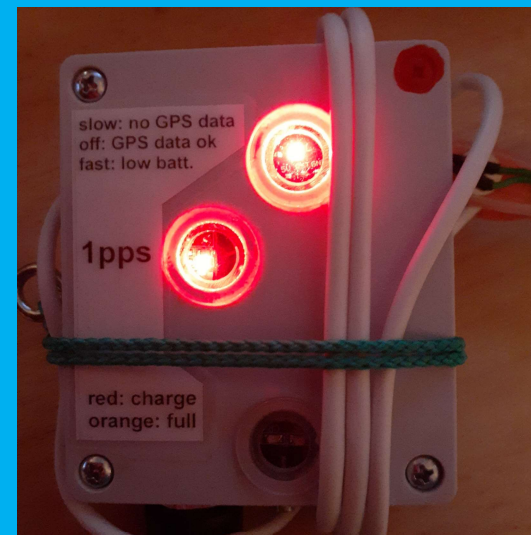
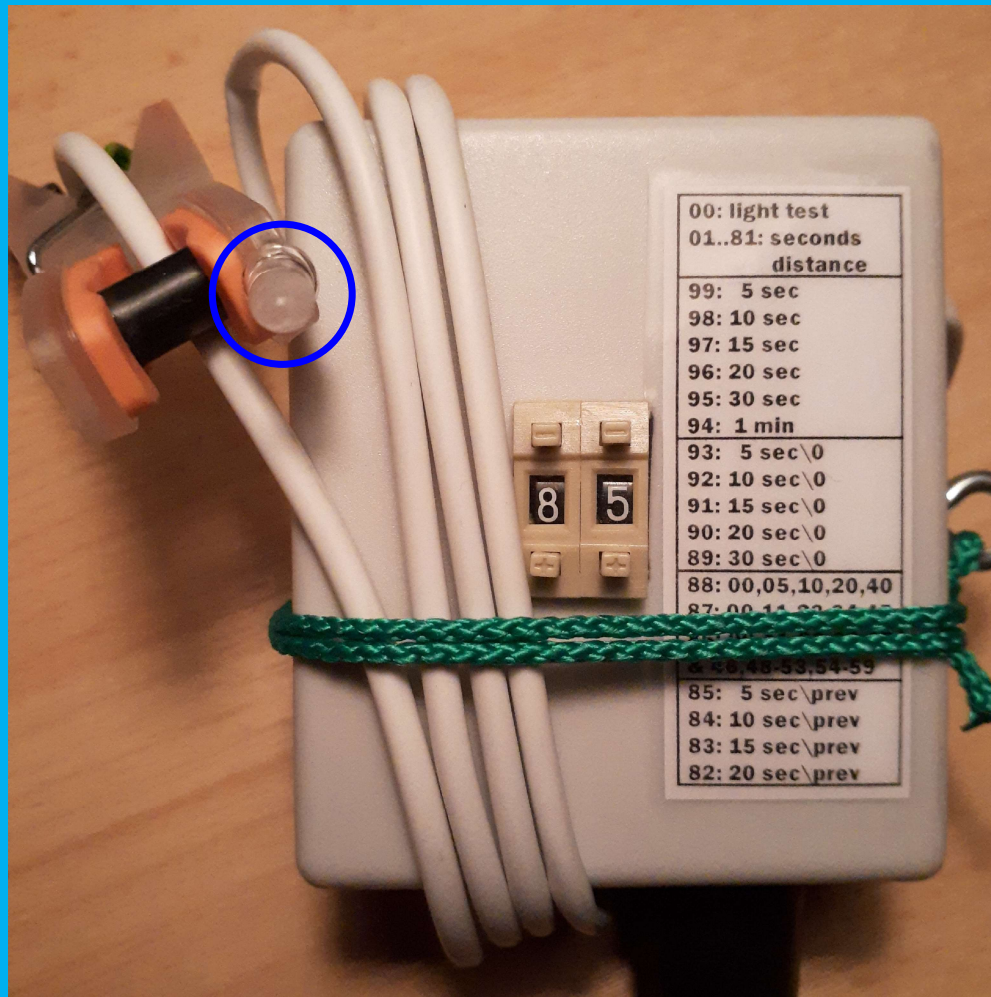
Zeitstempel? ->> 1 peak per second flasher

optisch! – unter 0,1ms Verzögerung!
an jedem Videosystem einsetzbar!

40ms Blitz, viele Blitzmuster

5 Stunden Betrieb

#85: 40ms Blitz alle 5 Sekunden \ 55te



Auf GITHUB:

- Bauanleitung
- Bedienungsanleitung
- firmware code (Arduino nano)
- hardware PCB (EAGLE)

DIY! ->> https://github.com/leontodon1/1pps_flasher

Zeitstempel am S50

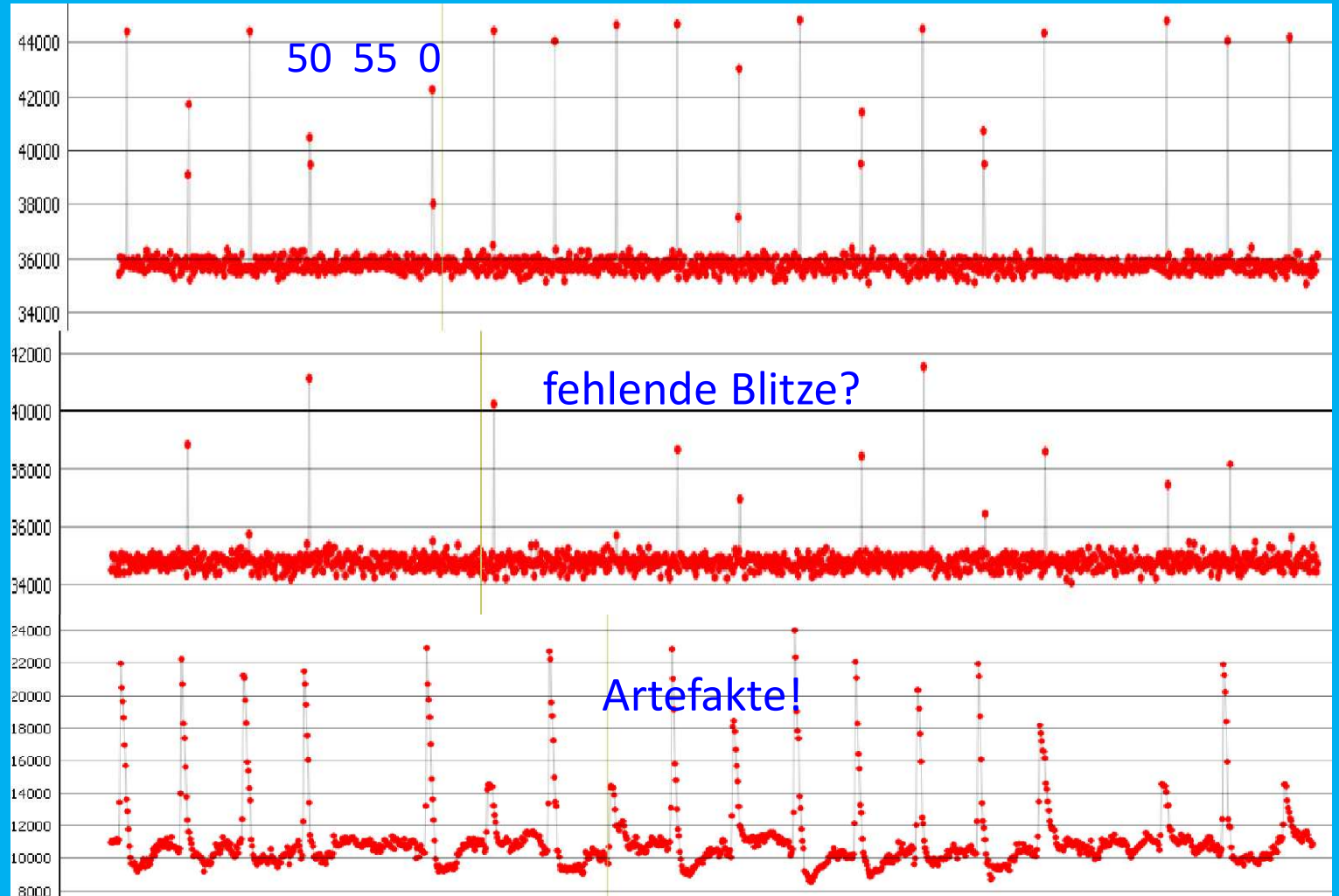
avi vs. mp4 (1x, #85)

avi „RAW“ 80ms

avi 35ms (1x)

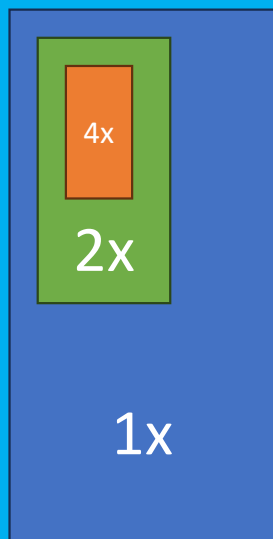
mp4 35ms

PyMovie / PyOTE



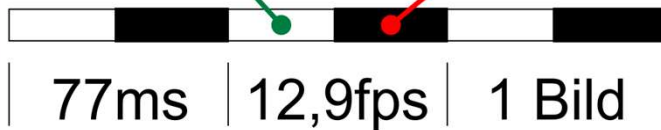
Achtung Falle! Belichtungszeit und fps beim S50

FOV Formate

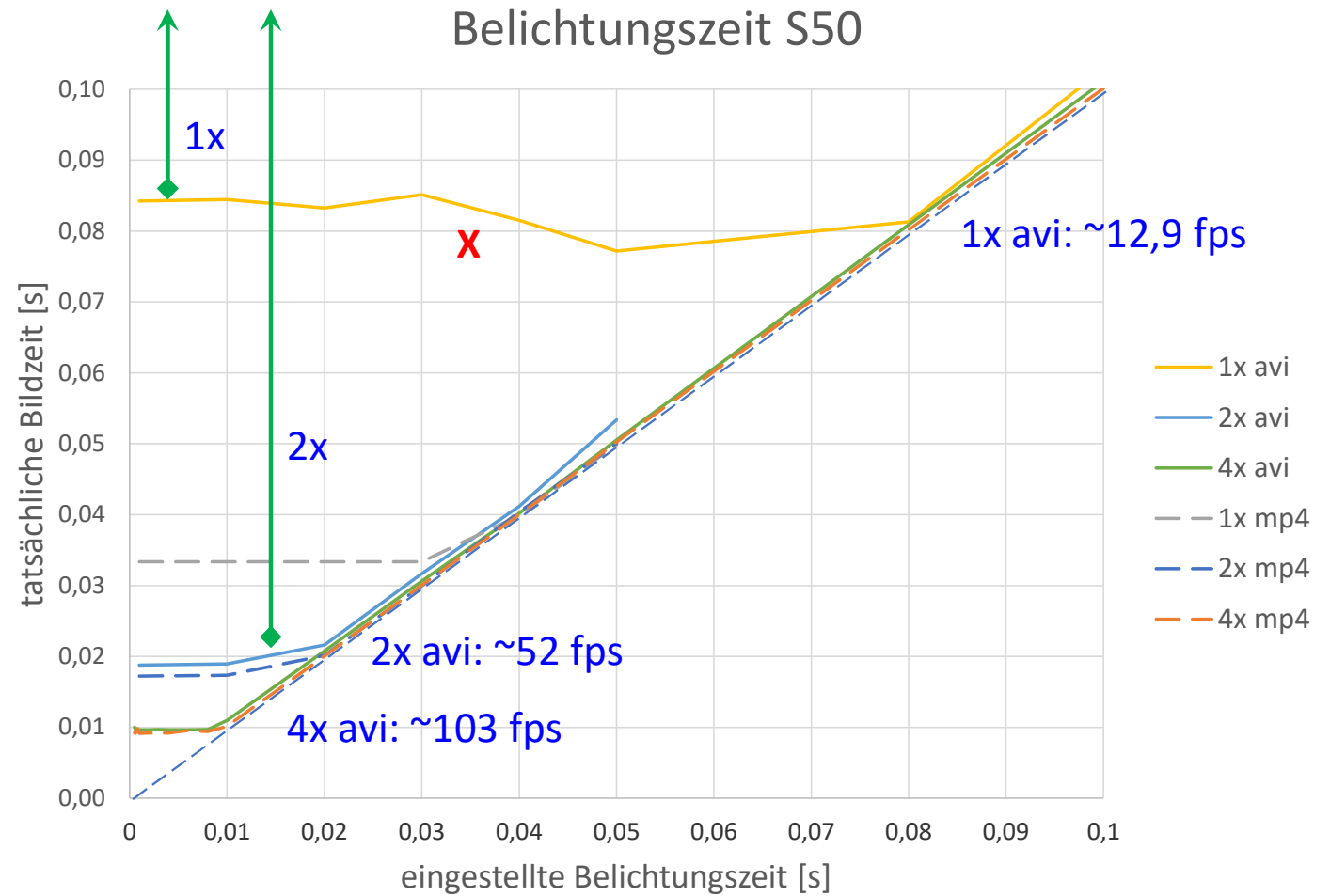


belichtet, unbelichtet

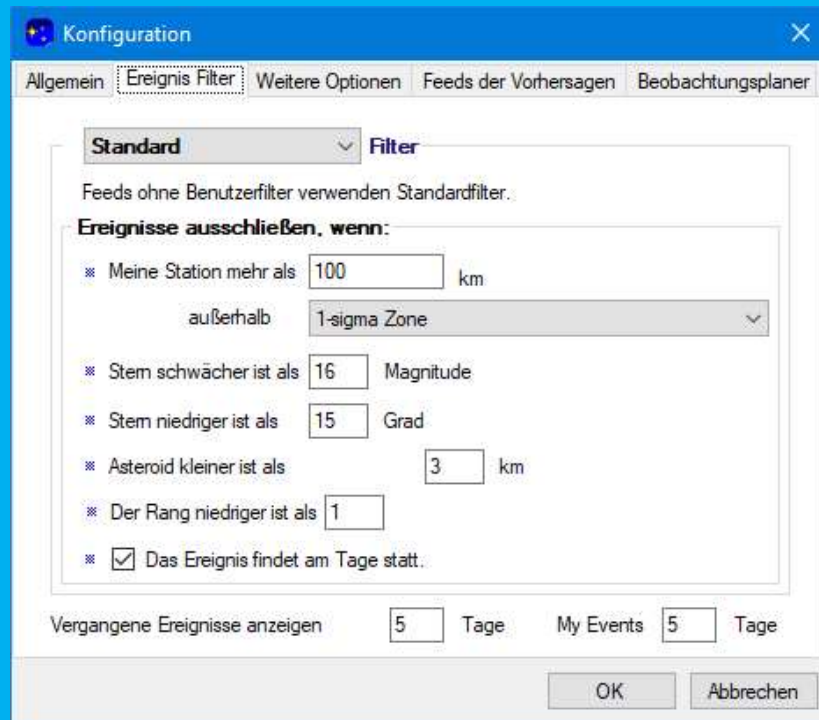
X



Belichtungszeit S50



Occult Watcher - Ereignis Filter



Benötigte Filter für S50 mobil:

Distanz Erdoberfläche < 30 km
drop > 2,5mag

gesuchtes Ergebnis:

- Bilder maximal möglich (frames_max ≥ 3)
=> Filter!
- kleinst mögliche Belichtungszeit t_exp_min (SNR > 3)
Martin Gutekunst, 2025 ESOP 44 in Posen/PL

Parameter für
t_exp_min, frames_max

Optik: Brennweite, Öffnung
Kamera: Pixelgröße, binning, Empfindlichkeit
OW: Dauer, Helligkeit, mag drop, Distanz

max. Magnituden beim S50 - h~45°

Grenzgröße

Nachweisgrenze:

$SNR \ll 3$

experimentell ermittelt

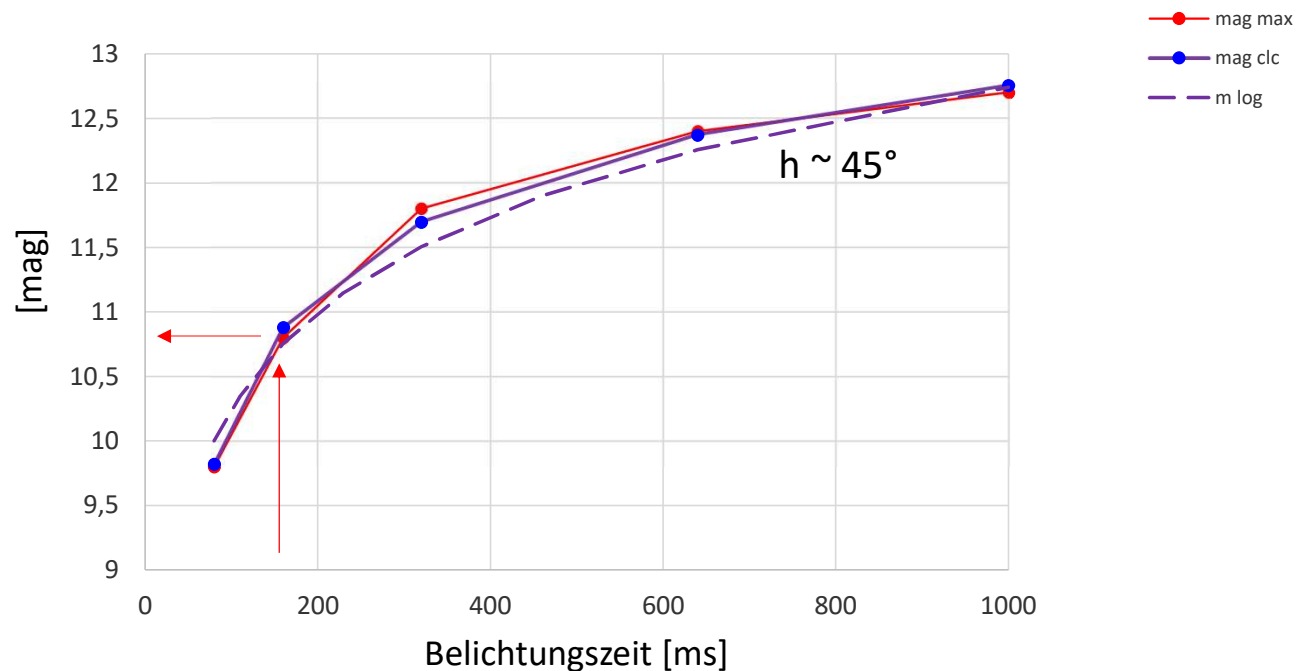
$$m_{log} = 10 + \frac{\ln(t_{exp(ms)}/80)}{\ln(100^{0,2})}$$

empirische Formel (h ~ 45°):

..nur anhand Belichtungszeit

$$m_{max} = (-20500 + 6800 * \ln(t_{exp(ms)}))^{0,25}$$

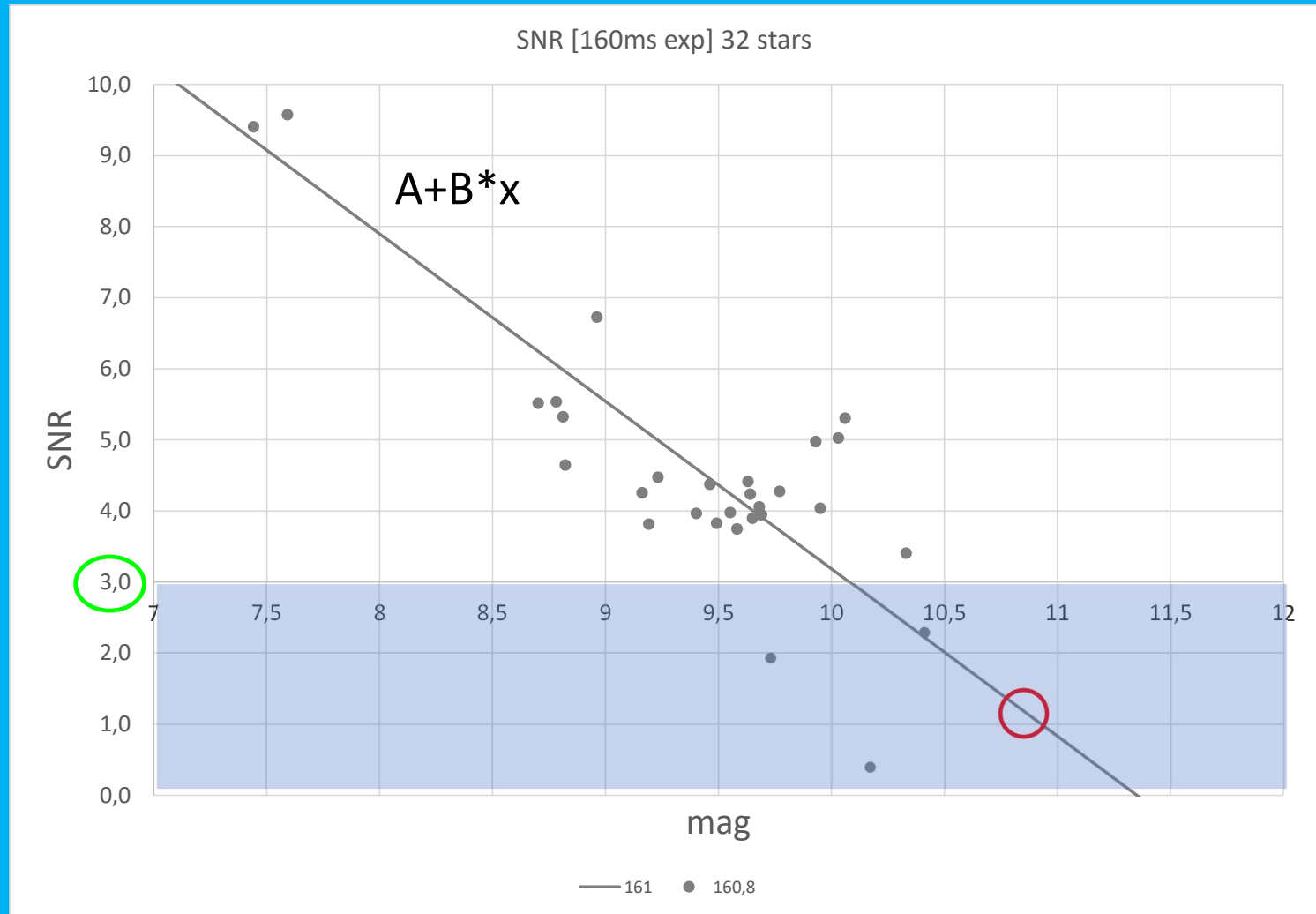
mag max. S50



Form: $(A + B * \ln(t))^{0,25}$ empirisch

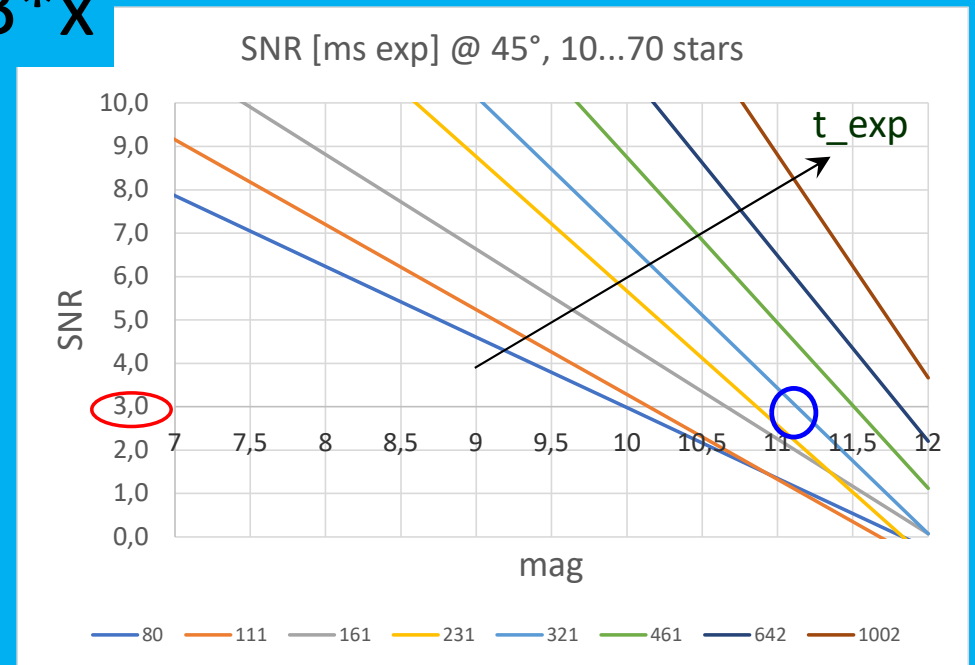
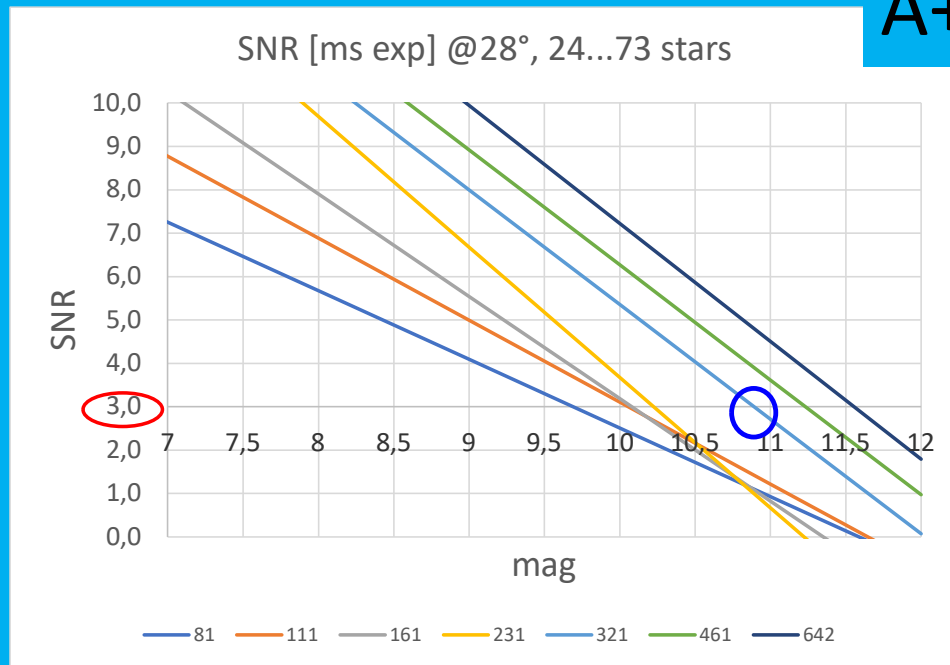
Signal-Rausch-Verhältnis S50

160ms Video
ca. 400 Bilder
Auswertung
Lichtkurven
von 32
Sternen



Signal-Rausch-Verhältnis S50

$$A+B \cdot x$$



Extinktion 28° versus 45°: ca. 0,3 mag

Extinktion 45°: ~0,1 mag

Magnituden beim S50 @ SNR=3 & Extinktion

$$m_{Extinktion} = k * A * h^B$$

$$k = 0,2 \text{ vis. } (0,15 \text{ cam.})$$

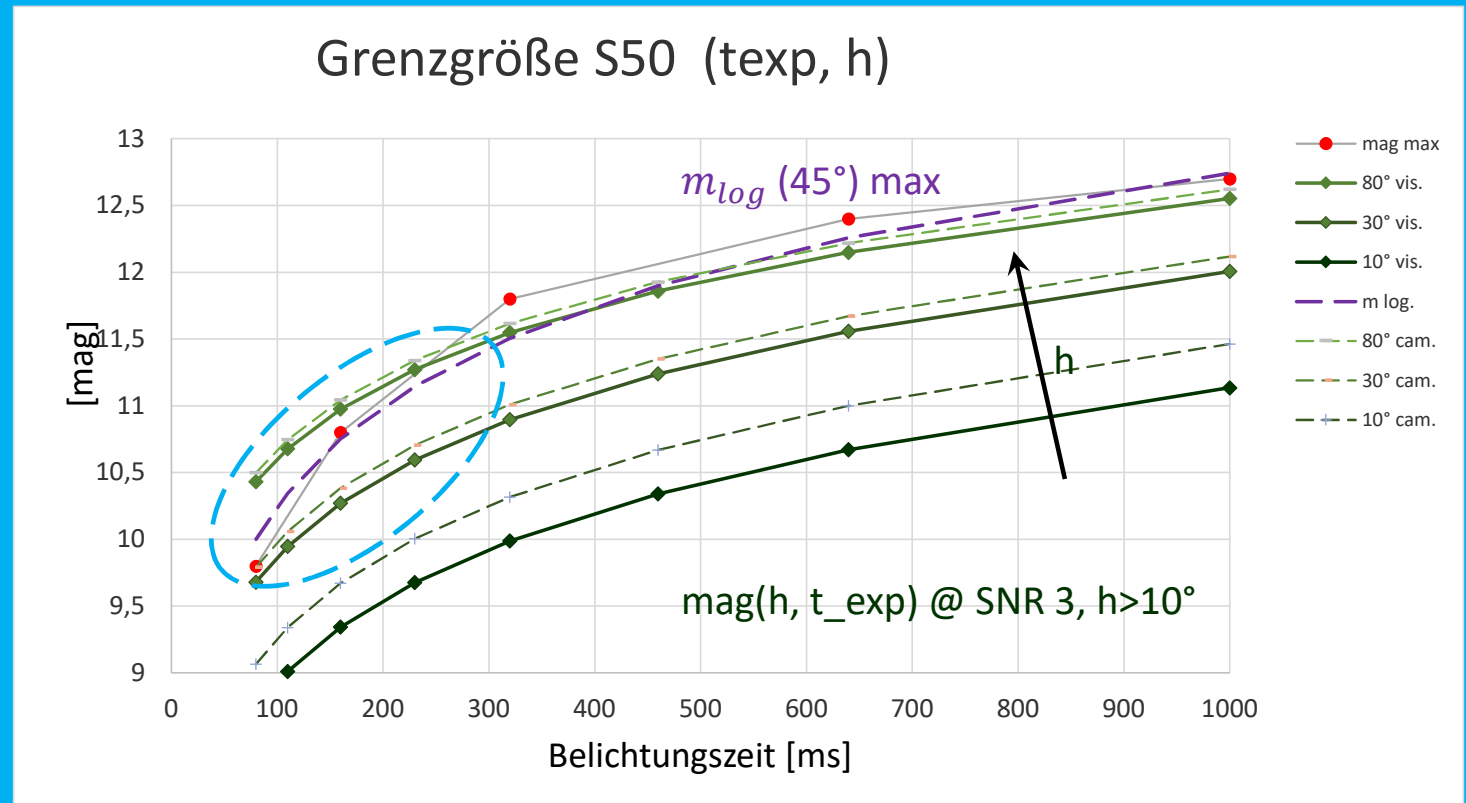
$$A = 38,6 \quad B = -0,85$$

$$m_{log}(t_{exp})$$

Auswertbarkeit nur höher

SNR = 3 !

Belichtungszeit, Sternhöhe



$$h > 10^\circ: \text{mag}(t_{exp}, h) = A(h) * t_{exp}^{B(h)} - \text{Extinktion}$$

$$\text{mag}(S50, @SNR = 3) = (6,6 + 0,014 * h) * t_{exp(ms)}^{(0,088-0,0002*h)} - m_{Extinktion}$$

$$\text{mag}(S50, @SNR = 3) = (7,9 - 0,014 * (90 - h)) * t_{exp(ms)}^{(0,07+0,0002*(90-h))} - (0,2 + 0,0035 * e^{0,07*(90-h)})$$

Auszug Occult Watcher - 3 Wintermonate: 2800 Ereignisse

< 10mag, 5km Größe, 30km Distanz: 17 Ereignisse (angezeigt)

< 11mag, 40km Distanz: 47 Ereignisse

OW Filter:

<100 km Dist.

<16 mag

>15 ° Höhe

>3km Größe

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	30	100	2	1,5	-20500	3	160	Macro: ctrl+m only OBS	readme!	0,00%		10		S50			2,5	5		
2	20	A5-B5/2	3	2,5	6800		320	Macro: ctrl+e ALL	time sort: AM	5,00%		15,5		C11			0,1	3		deaktivieren
3	S50	travel di	4	1000	0,5	C11	640	sort by AM		0,00%		10		S50			2,5	5		
4	Dist	km S	res n	fram	ms e	fram	Tex	Name Asteroid	Datum Ereignis	Wahrsch	Distanz	Mkomb	MAst	MSte	tmax	R) dr	(V) dr	Schal	Sternl	Geme
33	28	6	7,8	2,6	114	7,5	40	(22085) 2000 AA169	Mo 29 Dez, 22:29	0%	28 km	9,5	18,2	9,5	0,3	8,1	8,7	6 km	31° SE	1
57	20	8	9,0	2,9	170	12,5	40	(83282) 2001 RD88	So 04 Jan, 03:17	0%	20 km	9,9	19,7	9,9	0,5	8,8	9,8	8 km	33° W	1
81	3	5	8,4	4,2	95	10,0	40	(106810) 2000 XY39	Sa 10 Jan, 17:33	44%	3 km S	9,2	18,4	9,2	0,4	8,4	9,2	5 km	26° NE	1
91	7	6	6,9	35,8	22	20,0	40	(71124) 1999 XR173	Di 13 Jan, 21:52	19%	7 km N	8,9	17,8	8,9	0,8	7,9	8,9	6 km	72° S	2
118	1	5	8,8	5,4	73	10,0	40	(117782) 2005 GL115	Di 20 Jan, 21:57	27%	1 km E	9,7	20	9,7	0,4	9,5	10,3	5 km	65° SE	1
159	19	12	11,6	35,0	20	17,5	40	(163407) 2002 RH5	Di 03 Feb, 22:45	14%	19 km I	7,2	19,2	7,2	0,7	11,4	12	12 km	30° SE	1
165	24	5	7,8	9,6	52	12,5	40	(88972) 2001 TT58	Mi 04 Feb, 23:15	0%	24 km	9,4	18,8	9,4	0,5	8,6	9,4	5 km	62° SE	1
176	2	9	10,8	22,5	27	15,0	40	(20710) 1999 XP10	Sa 07 Feb, 00:45	100%	2 km N	7,8	19,3	7,8	0,6	10,5	11,5	9 km	17° W	1
204	30	5	8,9	6,6	76	12,5	40	(104924) 2000 JL21	Mo 16 Feb, 21:33	0%	30 km	9,9	20,5	9,9	0,5	9,9	10,6	5 km	81° SE	2
208	25	5	10,9	20,0	20	10,0	40	(60815) 2000 HY32	Di 17 Feb, 22:08	0%	25 km	7,1	18,3	7,1	0,4	10,4	11,2	5 km	51° E	1
267	23	41	10,5	100,0	20	50,0	40	(5368) Vitagliano	Do 12 Mrz, 21:06	7%	23 km	7	17,7	7	2	9,8	10,7	41 km	39° W	2
306	5	5	8,4	3,6	111	10,0	40	(43652) 2002 EQ88	Mi 24 Dez, 04:07	0%	5 km S	9,4	18,6	9,4	0,4	8,3	9,2	5 km	26° SW	0
742	24	5	13,5	1,1	182	5,0	40	2015 BZ61	Mo 05 Jan, 01:54	0%	24 km	9,5	23,3	9,5	0,2	13,1	13,8	5 km	19° E	0
1821	19	12	11,6	35,0	20	17,5	40	(163407) 2002 RH5	Di 03 Feb, 22:45	14%	19 km I	7,2	19,2	7,2	0,7	11,4	12	12 km	30° SE	0
1868	24	5	7,8	9,6	52	12,5	40	(88972) 2001 TT58	Mi 04 Feb, 23:15	0%	24 km	9,4	18,8	9,4	0,5	8,6	9,4	5 km	62° SE	0
1985	2	9	10,8	22,5	27	15,0	40	(20710) 1999 XP10	Sa 07 Feb, 00:45	100%	2 km N	7,8	19,3	7,8	0,6	10,5	11,5	9 km	17° W	0
2272	30	5	8,9	6,6	76	12,5	40	(104924) 2000 JL21	Mo 16 Feb, 21:33	0%	30 km	9,9	20,5	9,9	0,5	9,9	10,6	5 km	81° SE	1

JPL Seite

5368 Vitagliano (1984 SW5)

Classification: Outer Main-belt Asteroid SPKID: 20005368 Related Links: [Ephemeris](#)

Orbit Viewer [\[show\]](#)

Orbit Parameters [\[show\]](#)

Physical Parameters [\[hide\]](#)

Parameter	Value	Units	Sigma	Reference	
[H] absolute magnitude	11.13			MPO914192	
diameter	34.807	km	0.415	urn:nasa:pds:neowise_diam...	
rotation period	59.36	h		LCDB (Rev. 2023-October);...	[Result based on less than full coverage...]
geometric albedo	0.058		0.011	urn:nasa:pds:neowise_diam...	

[Result based on less than full coverage, so that the period may be wrong by 30 percent or so.] REFERENCE LIST:[Warner, B.D.; Stephens, R.D.; Coley, D.R. (2017) Minor Planet Bull. 44, 130-137.]

<https://ssd.jpl.nasa.gov/horizons>

(5368) Vitagliano – DAMIT (Uni Prag)

Database of Asteroid Models from Inversion Techniques

damit.cuni.cz/projects/damit/?q=5368

DAMIT Models Tumblers Tables Export Documentation More

Modell 13151 vs. 13152:
Unterschied am 12.03.2026: 0,33 Umdrehungen (118,6°)
P: $\pm 0,001h$ entspricht $\pm 0,11$ Umdrehungen ($\pm 39,5^\circ$)

5368
(10757 asteroid)

Models

	λ	β	P	Files
(5368) Vitagliano				LCref lc.txt lc.js
View model	35	62	30.281	IAUspin shape.pr
View model	205	63	30.278	IAUspin shape.pr

vgl. JPL: 59,36h, DAMIT 29,69h: Faktor 2 mit Δ -2%

<https://damit.cuni.cz> Ďurech & Hanuš (2023)

damit.cuni.cz/projects/damit/asteroid_models/view/13151

DAMIT Models Tumblers Tables Export Documentation More

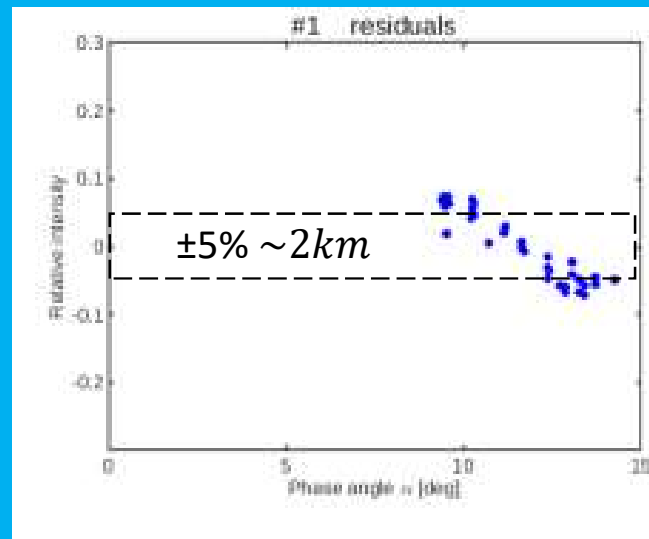
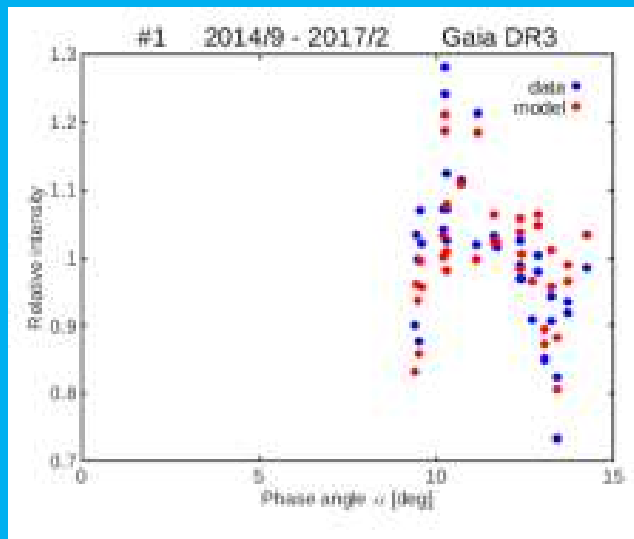
(5368) Vitagliano – Model 13151

Details

ID	13151
Asteroid	(5368) Vitagliano
λ	35
β	62
P	30.281
YORP	
t_0	2456916 15.09.2014
φ_0	0
Light Scattering Model	LSL
p_1	0.1
p_2	0.5
p_3	0.1
p_4	-0.68

(5368) Vitagliano – ISAM

Infrared Standard Asteroid Model



Light curve fits for (5368) model 13152

Event JD = 2461112.3375

Daily rotation rate = 285.355038°/day (= model 13152)

Anm: 0,000001°/day entspricht ± 1,3 Sek.

Occult v4.2025.9.10

Satellite IR diameters for asteroid (5368)

NEOWISE: 34.8 ± 3.2km: albedo 0.058

AcuA: 39.3 ± 7.6km: albedo 0.046

Weighted diameter: 35.5 ± 3.2 km
[including recommended increase in uncertainty]

Individual diameter and albedo measurements

34.8 ± 3.2km: albedo 0.058: NEOWISE

39.3 ± 8.4km: albedo 0.046: AcuA

Estimated diameter, absolute mag. H0 = 11.17

albedo 0.40 => diameter = 12 km

albedo 0.35 => diameter = 13 km

albedo 0.30 => diameter = 14 km

albedo 0.25 => diameter = 16 km

albedo 0.20 => diameter = 17 km

* albedo 0.15 => diameter = 20 km *

albedo 0.10 => diameter = 25 km

albedo 0.09 => diameter = 26 km

albedo 0.08 => diameter = 27 km

albedo 0.07 => diameter = 29 km

albedo 0.06 => diameter = 32 km

albedo 0.05 => diameter = 35 km

albedo 0.04 => diameter = 39 km

albedo 0.03 => diameter = 45 km

albedo 0.02 => diameter = 55 km

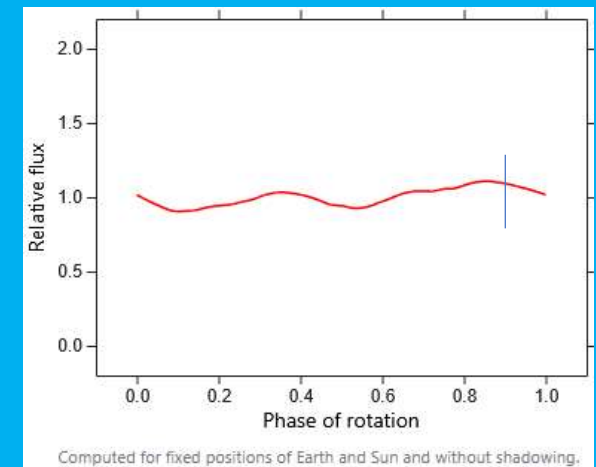
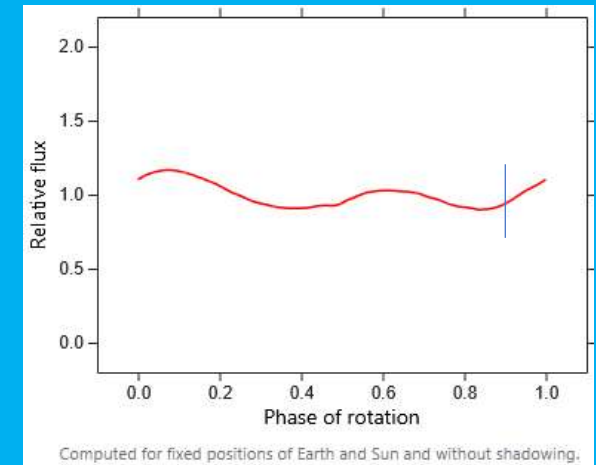
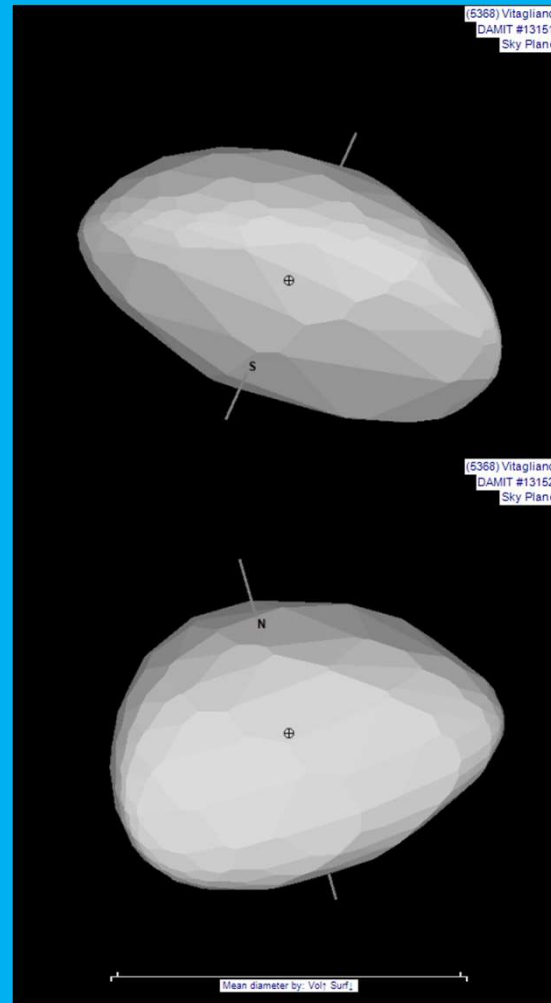
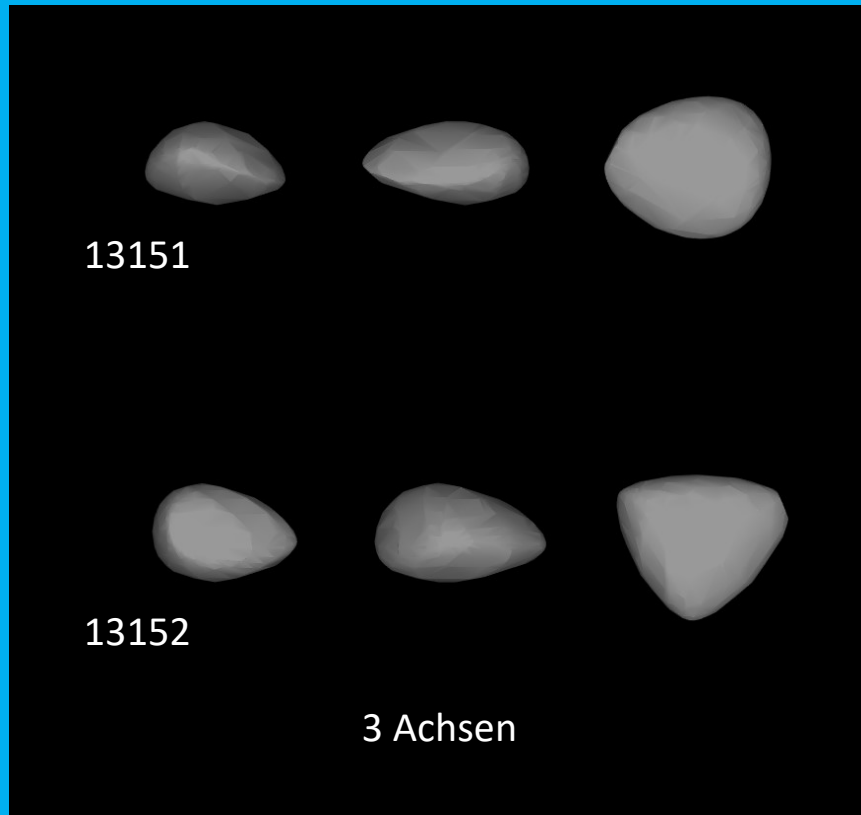
albedo 0.01 => diameter = 78 km

Trojans 0.06 => diameter = 32 km

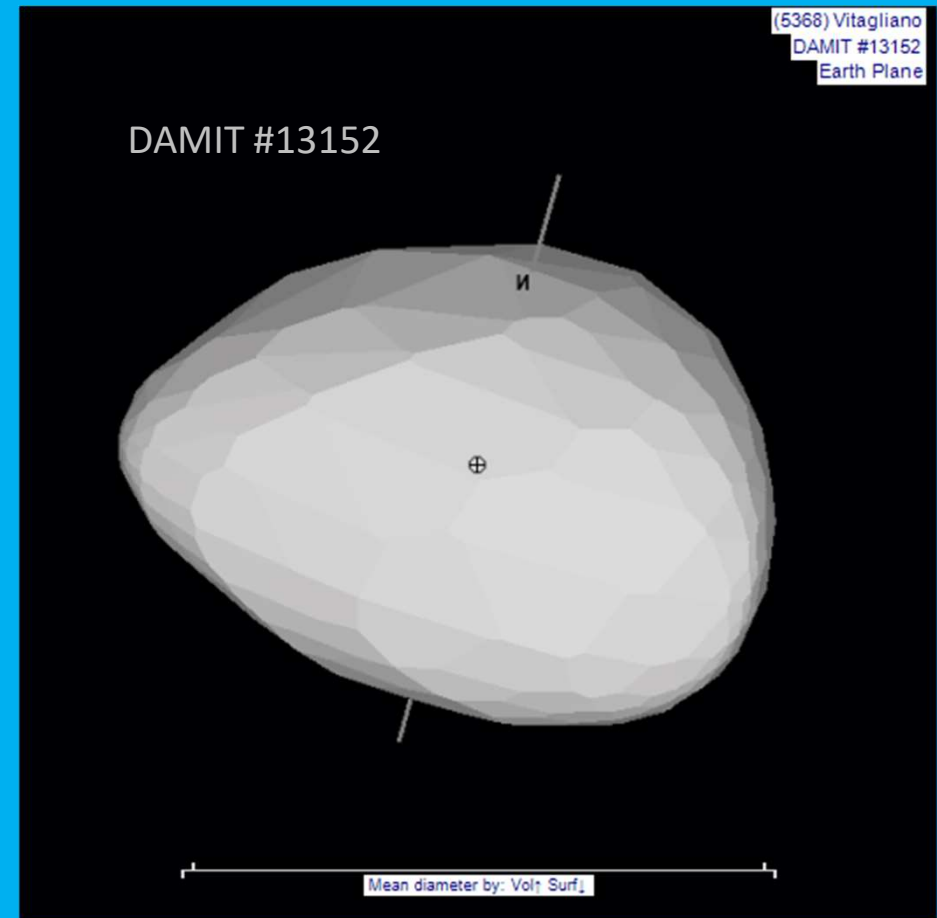
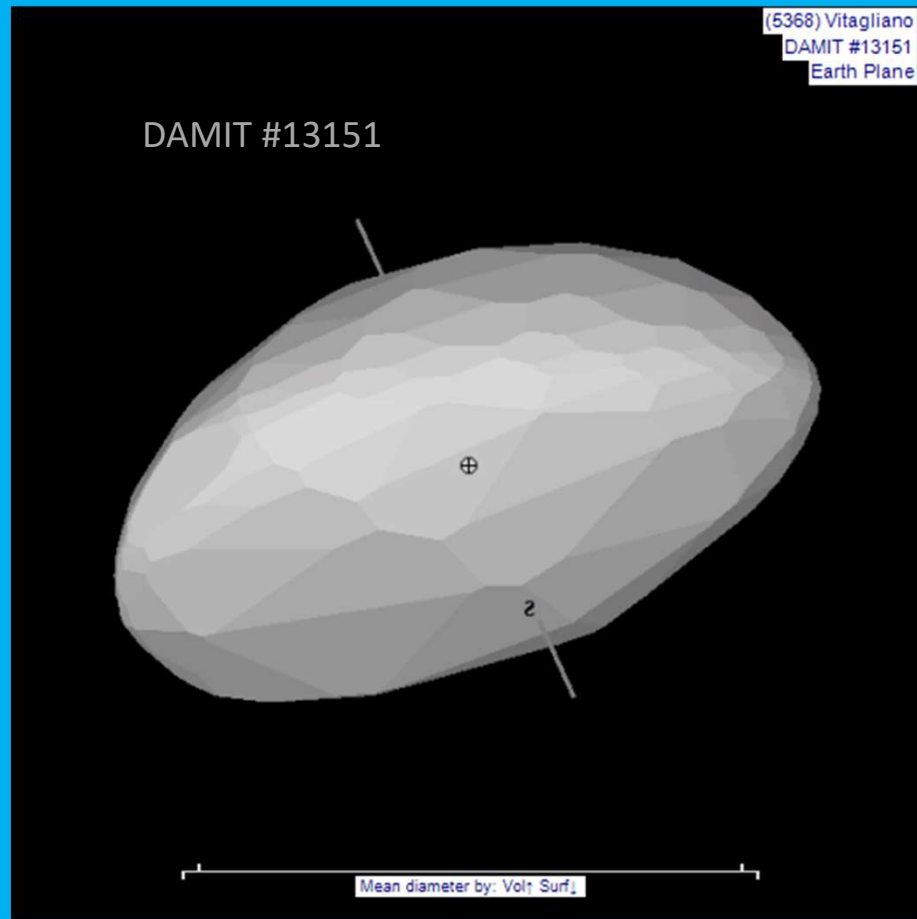
NEOWISE: 2009-2013/2024 (genauer)

AcuA = Asteroid Catalog using AKARI: 2006 - 2011 (Ergänzung)

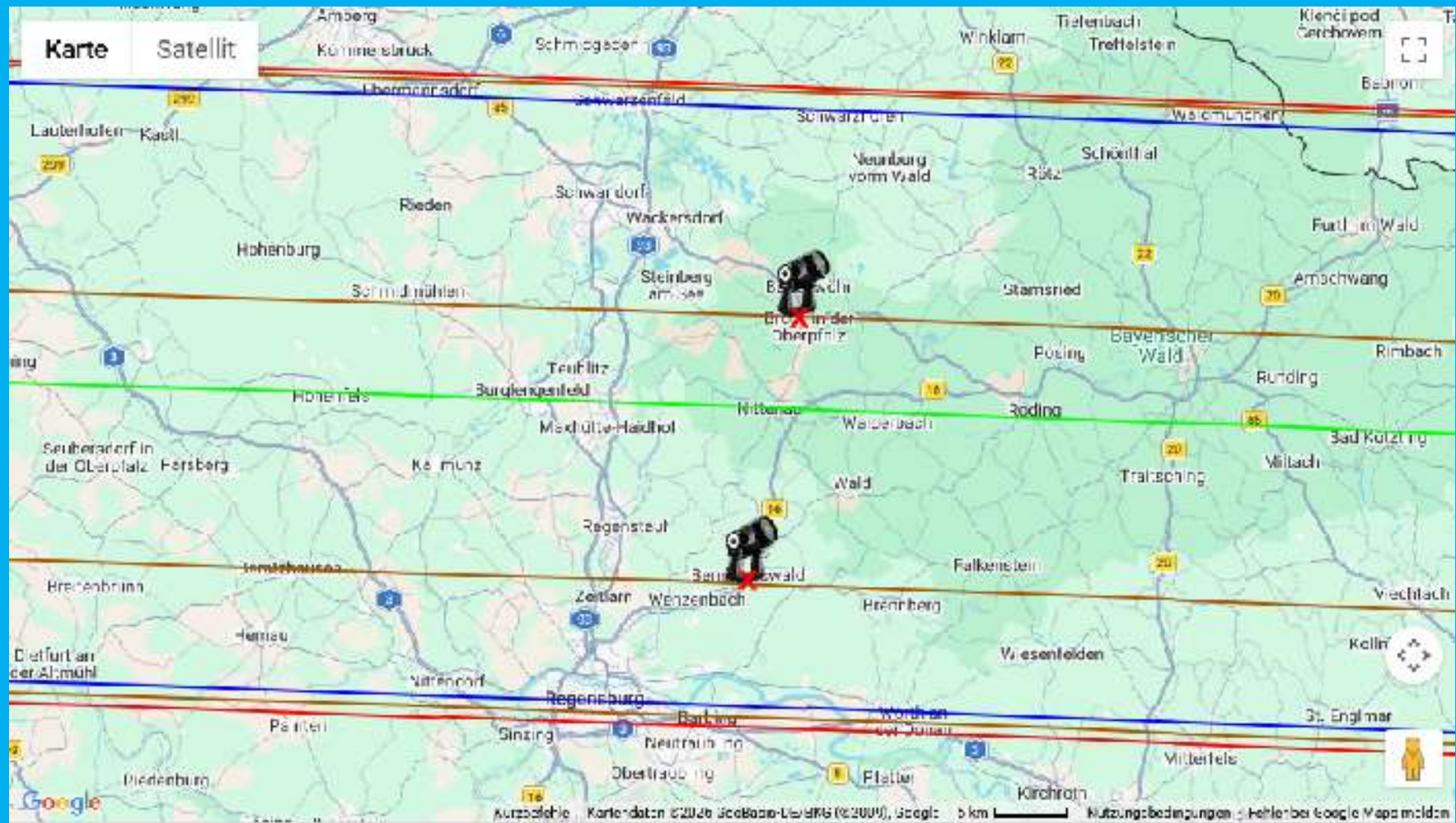
(5368) Vitagliano – DAMIT Modell 13151, 13152 (occult4)



(5368) Vitagliano – animated $\pm 5^\circ$ / ± 25 Min.



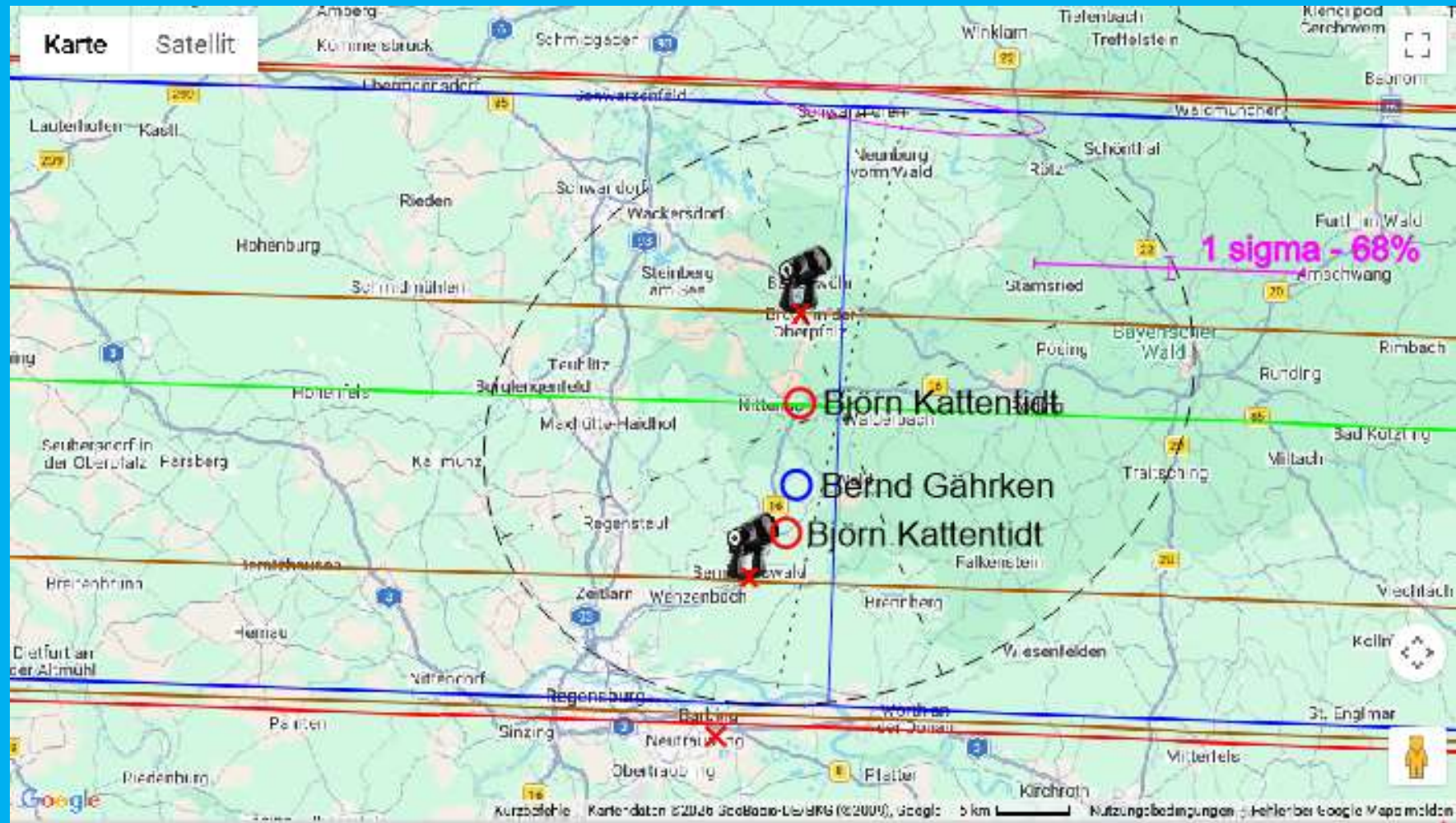
Expedition: Bedeckungspad und Standortplanung



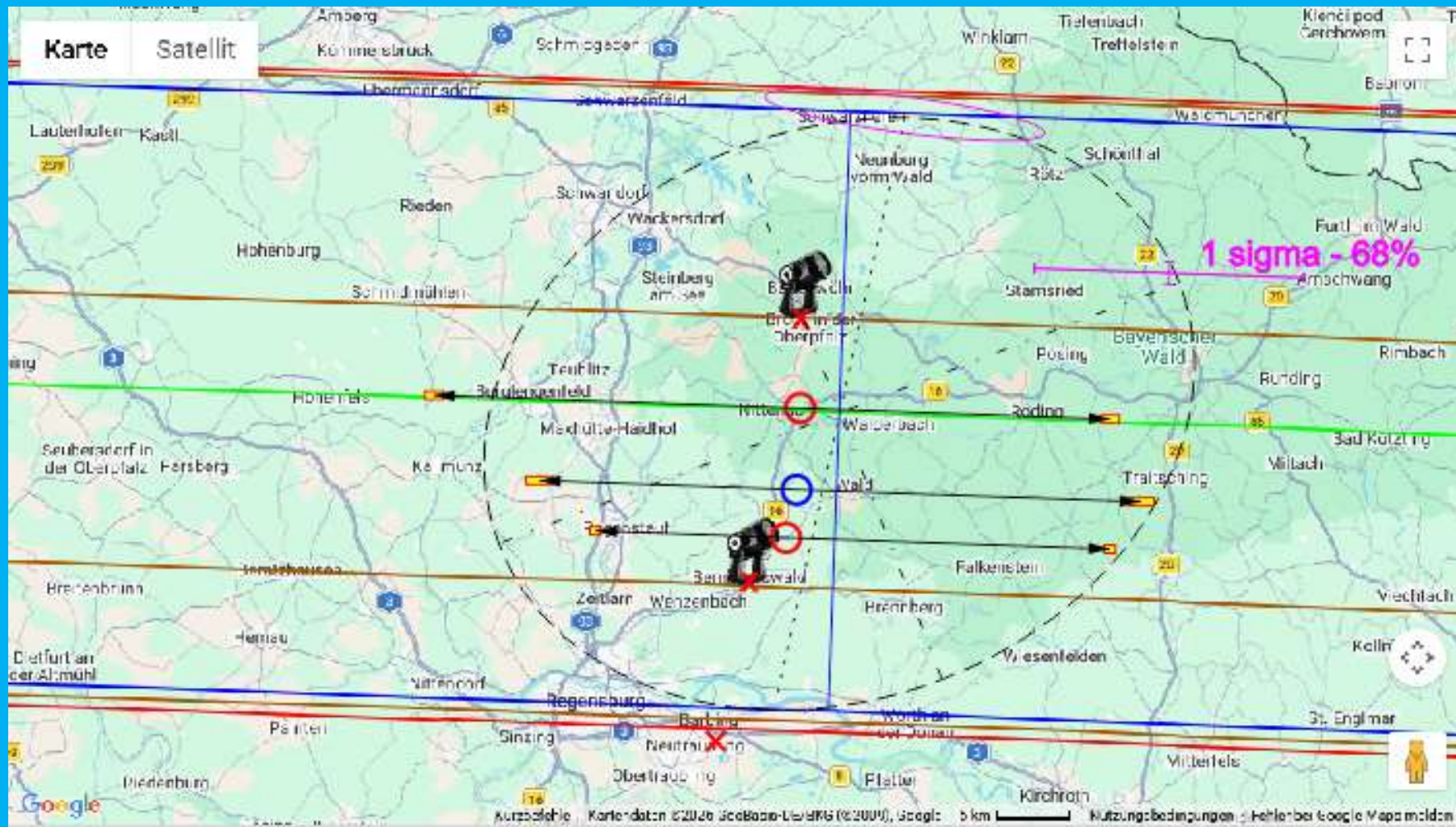
Projektion als kugelförmiger Asteroid



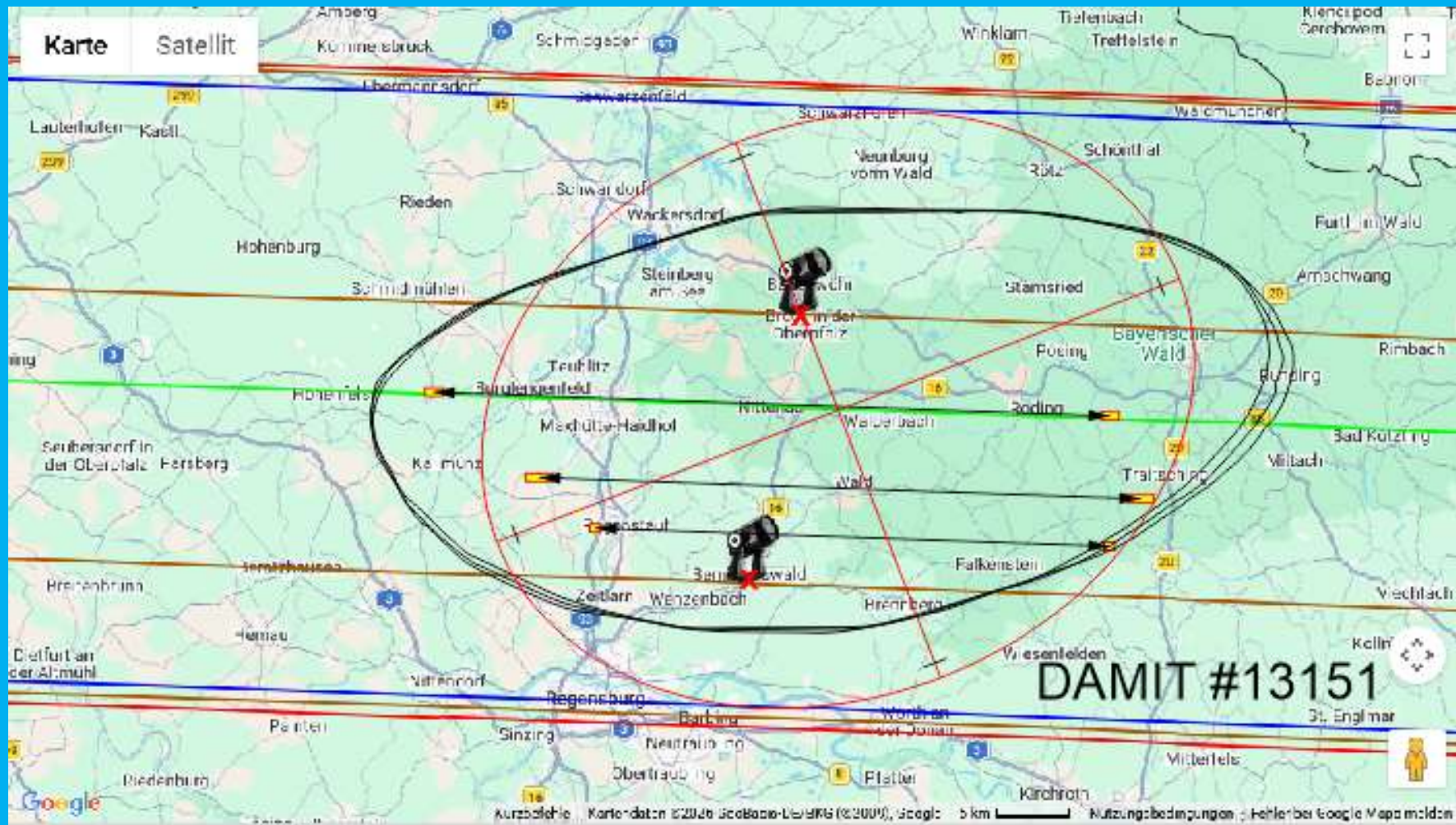
Tatsächliche Standorte



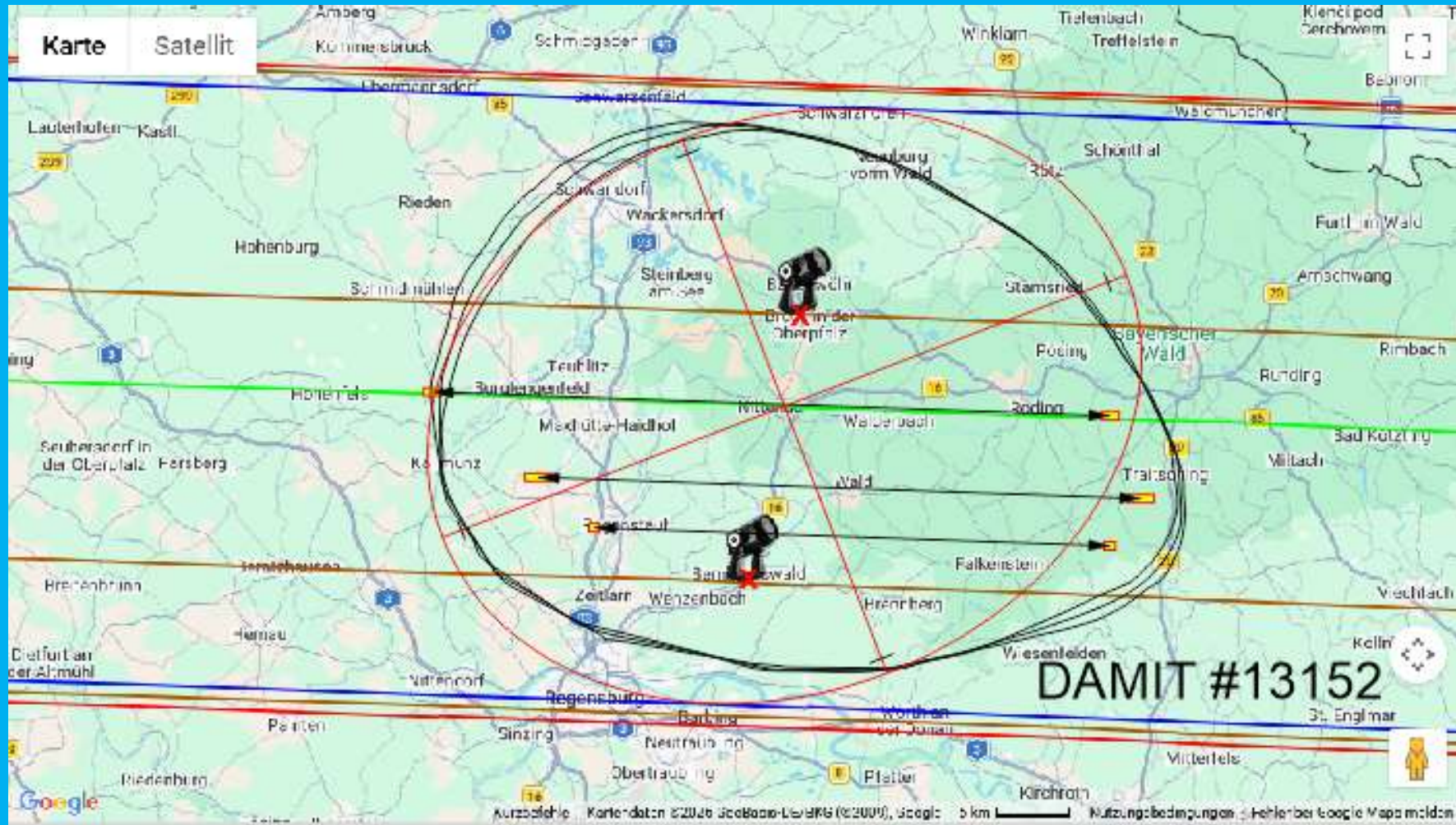
Gemessene Zeiten korrigiert projiziert

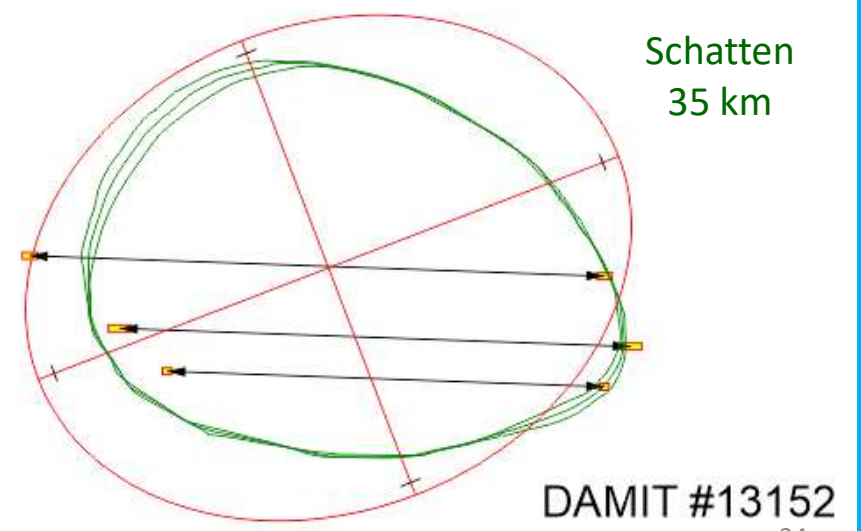
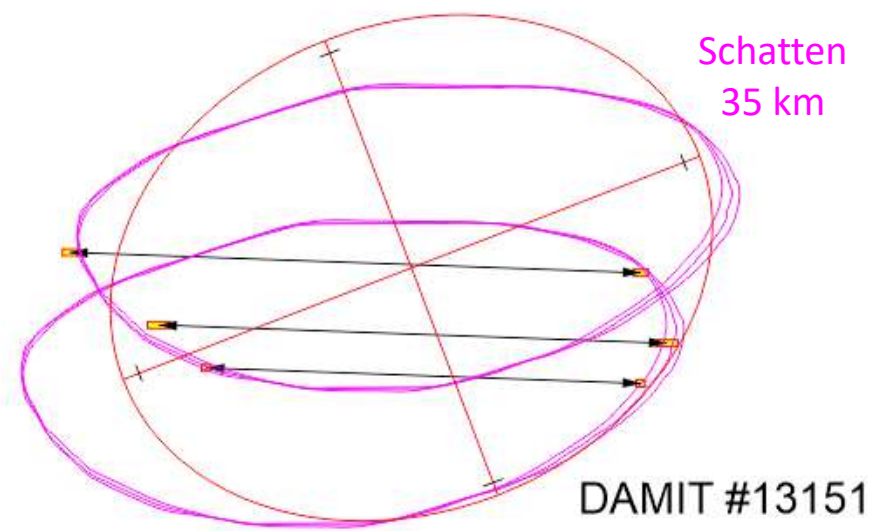
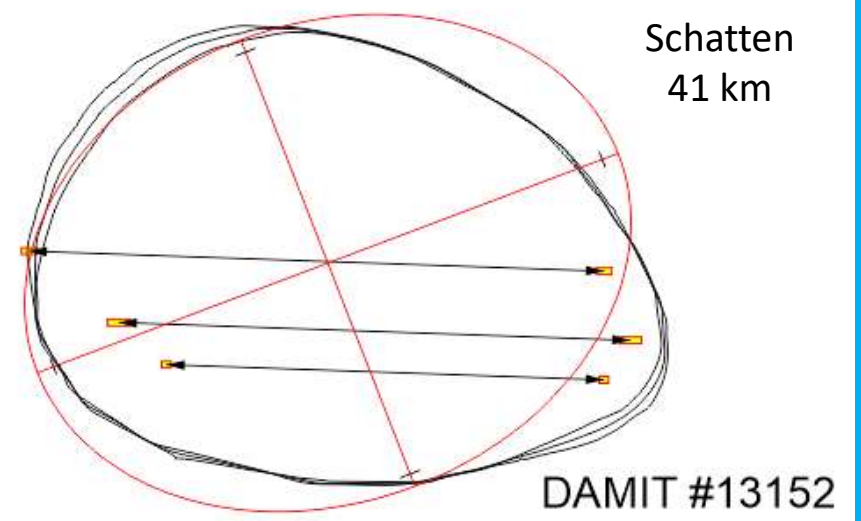
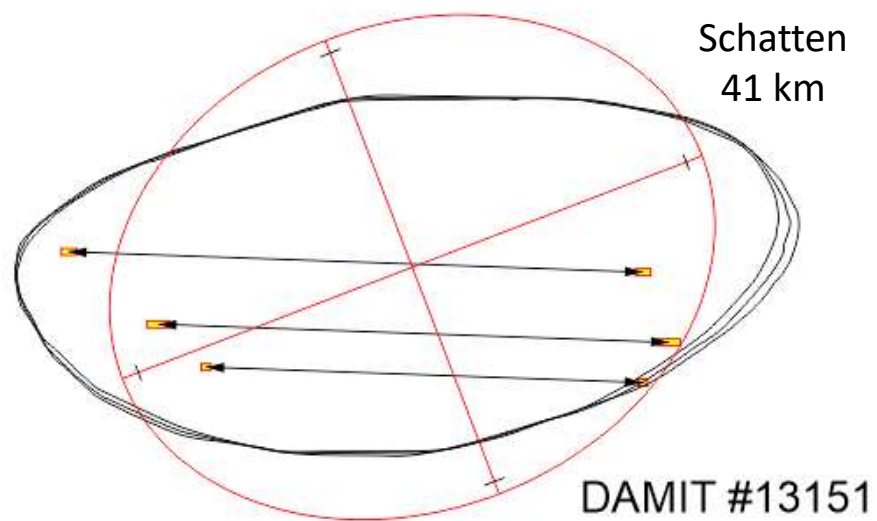


(5368) Vitagliano – Modell #1



(5368) Vitagliano – Modell #2





(5368) Vitagliano – Modell #2

Observed chord lengths

Length # Observer

5368 Vitagliano 2020 Apr 2 UCAC4 447-054339
13.9 km 1 D Gault

5368 Vitagliano 2022 Oct 9 UCAC4 360-195775
37.9 km 1 A Howell

5368 Vitagliano 2023 Sep 21 UCAC4 401-130857
33.8 km 1 P Maley

Satellite IR diameters for asteroid (5368)

NEOWISE: 34.8 ± 3.2km: albedo 0.058

AcuA: 39.3 ± 7.6km: albedo 0.046

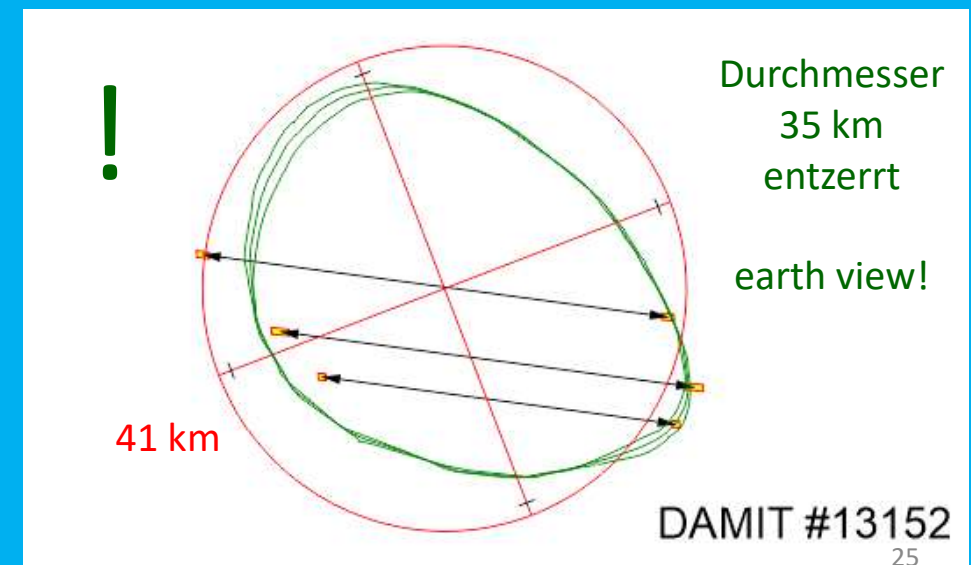
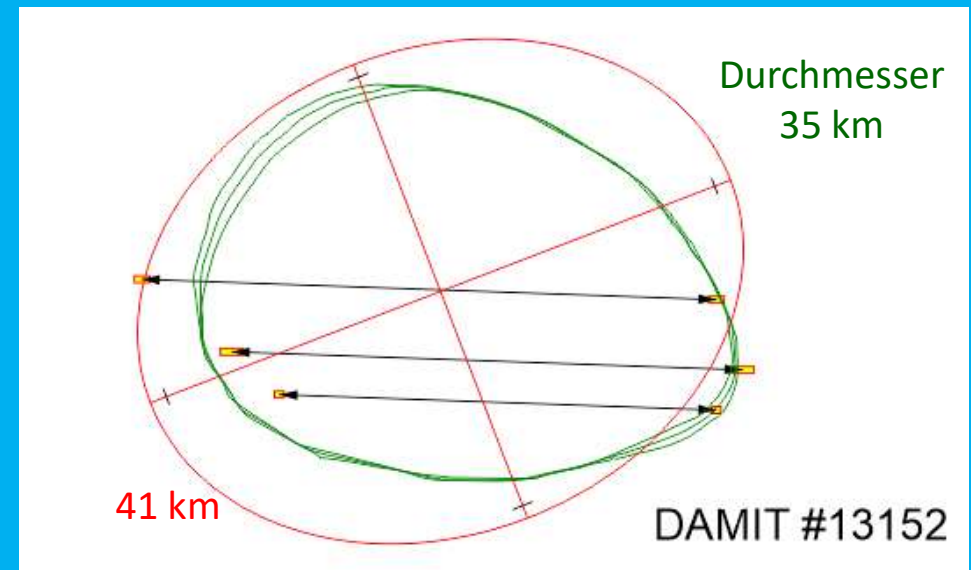
Weighted diameter: 35.5 ± 3.2 km
[including recommended increase in uncertainty]

Individual diameter and albedo measurements

34.8 ± 3.2km: albedo 0.058: NEOWISE

39.3 ± 8.4km: albedo 0.046: AcuA

Occult v4.2025.9.10



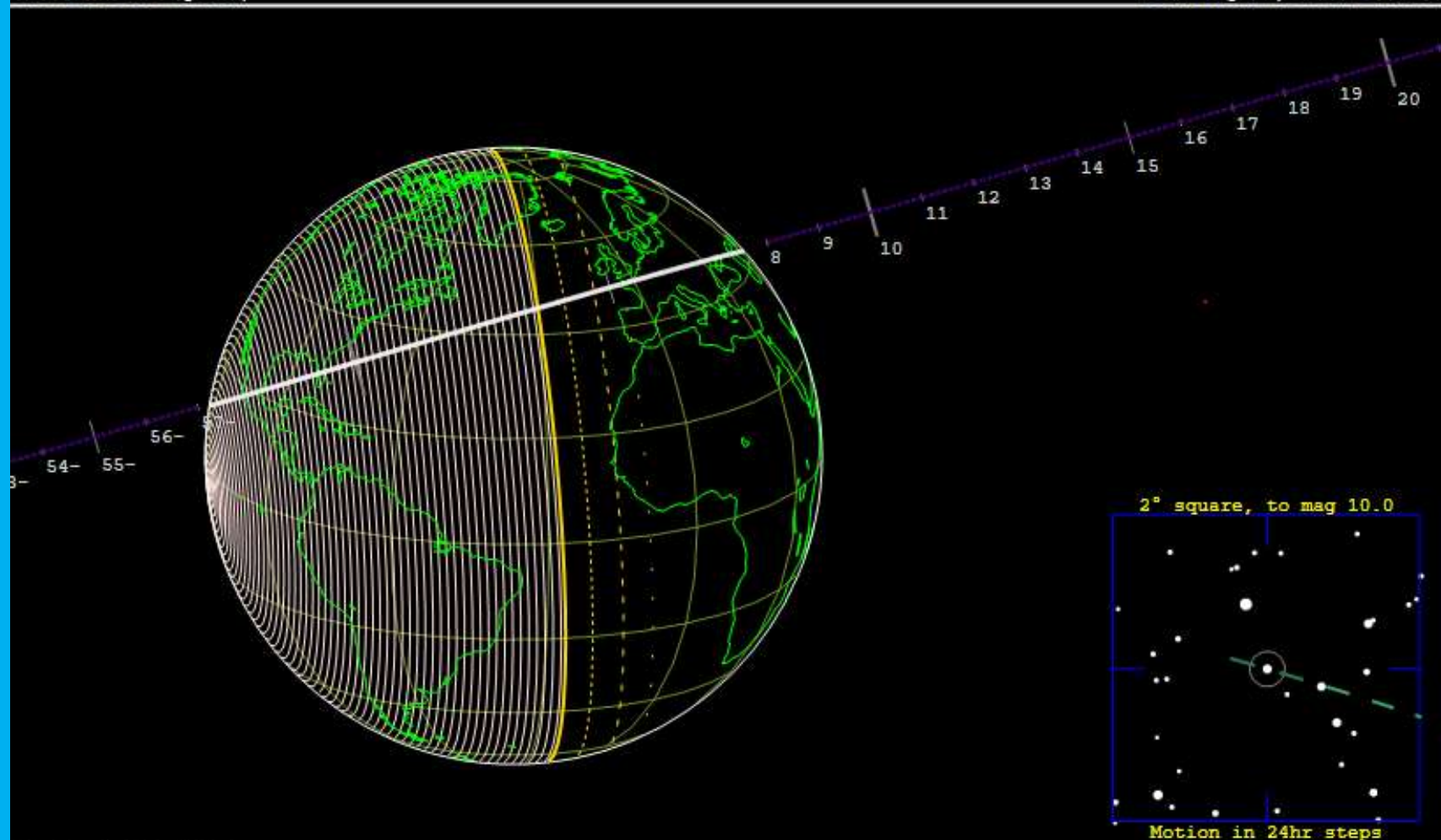
**(5368) Vitagliano – „Modelle“
1 : 1000 000**



Danke für Eure Aufmerksamkeit

5368 Vitagliano occults HIP 22990 on 2026 Mar 12 from 19h 57m to 20h 8m UT

Star: (Dia = 0.1 mas)	Durations: Max = 1.93 secs	Asteroid: (in DAMIT)
Mv 7.0; Mr 6.2; [Mb 7.6]	1km = 0.054 secs, 1mas = 0.15 secs	Mv = 17.7; Mr = 16.8
RA = 4 56 47.5126 (astrometric)	Mag Drop: 10.8 [100%]v, 10.6 [100%]r	Dia = 36 ±3km, 13 mas
Dec = 16 44 2.735	Sun : Dist = 83°	Parallax = 2.360"
[of Date: 4 58 18, 16 46 31]	Moon: Dist = 155°, illum = 37%	Hourly dRA = 1.654s
Prediction of 2026 Jun 12.6	1σ Err: ±(2.7 x 0.4) mas in PA 81°	dDec = 6.87"
Reliable 1.1 (good),		JPL#72+Ephem, Known errors



Occult 4.2025.9.10

