# CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM LASBOR

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 $^2\mathsf{Polish}$  Space Agency

ILRS Workshop, DLR Stuttgart, 2019

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TWINS



## FIGURE: LASBOR 1nd (credits: CBK PAN)

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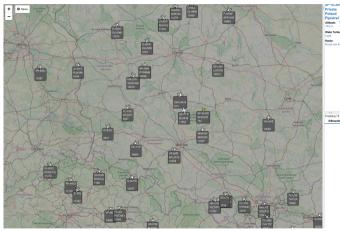


### FIGURE: LASBOR 2nd (credits: CBK PAN)

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			424945				
			490505	SPTOF*		564 m	
			490161	OKVUM14		914 m	204.5 km/8
		2718	505F6A			3665 m	
		AXECC	7393CA			10965 m	881.9 km/3
		B-KFW	783A18			9449 m	
		B-LID	70021A	CPA014	ECOF-WHHH	10668 m	946.7 km/h
		CS-TTP	495290			10965 m	758.0 km/h
		D-ABFR	304602			10973 m	
		D-AEBB	305442				
		D-AIDO	30646F	DUH2KK	ECOM-EPHK	11270 m	894.1 km/2
		D-ALL	306580	DUH995	EDDF-EYM	11880 m	903.8 km/h
		DAIR	306668	DUHSEK	EF HK-EDOM	9754 m	783.8 km/h
		D-AUTO	300631			12497 m	954.2 km/2
		D-EGZA	301550			671 m	
		EI-OYY	4CASEC			11582 m	
		01000	4CA789			8641 m	685.4 km/h
		D-FIN	4CAS3F			11582 m	763.0 km/h
		61-600	404936	RVR2718	EGMC-L2KZ	11278 m	892.8 km/h
		F-ORXF	394685	AFR1045	UUEE-LFP0	10965 m	738.2 km/h
		O-CETO	123456				

FIGURE: ADSB (credits: CBK PAN)

INTRODUCTION Auxiliary environment Software Tracking tests Questions... answers?

ADSB Meteo Meteo... others



FIGURE: ADSB - antenna (credits: CBK PAN)

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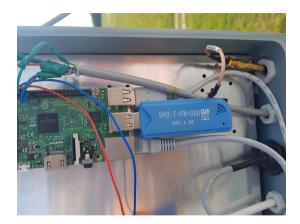


FIGURE: Raspberry (credits: CBK PAN)

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FIGURE: ADSB/Meteo/APRS (credits: CBK PAN)

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FIGURE: ADSB (credits: CBK PAN)

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6,942992	
14,090134	
-0.003722	
1,433421	
1,244566	
0,38571	
0.400087	
	1
And Personne	

FIGURE: Aircraft .. time "lag" (credits: CBK PAN)

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ADSB **Meteo** Meteo... others

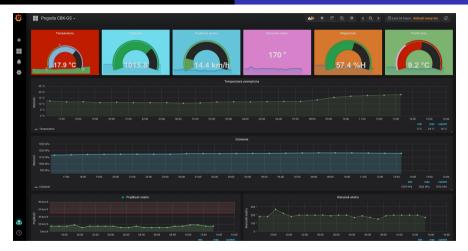


FIGURE: Meteo - Grafana (credits: CBK PAN)

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ADSB **Meteo** Meteo... others



FIGURE: Meteo sensor (credits: CBK PAN)

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FIGURE: Meteo ... (credits: CBK PAN)

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FIGURE: Weather balloon (credits: DWD Stuttgart)

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FIGURE: Educational activities (credits: CBK PAN)

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R41 N4240230 2791 51.1977
R41 N4240230 2792 51.12389 16.83248 5802m 48.66m/h 72NORIMY 40.968 498 4198
941 N4240230 4792 51.12309 15 03248 5002, 13 5680 01 770 5007 1 740 500 1 770 1 500 1 770 1 500 1 770 1 500 1 7 541 N4240230 4793 51.12400 15 0325 35000 A 5600 1 5600 1 560 1 700 1 500 1 700 1 700 1 700 1 700 1 700 1 700 1 541 N4240230 4795 51.12401 15 0335 5500 4 5600 1 5600 1 5600 1 700 1 560 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1
R41 N4240230 2794 51.12412 16.83257 5812m 48.4km/h 1ddeg 5.7m/s -3.688 548 458 f; 2
R41 N4240230 2796 51.12424 10.83268 5818m 50.4km/h 16deg 4.6m/s - 3.6d8 47% - 268 f; 4 R41 N4240230 2796 51.12437 16.83268 5824n 50.3km/h 16deg 6.6n/s - 3.5d8 4% +98
<b>R</b> <sup>4</sup> 1 N4240230 2799 51.12449 16.83278 5836m 50.4km/14deg 1.7/6 - 3.266 666 +18 fr 1 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12463 16.83276 5830m 54.4km/14deg 1.7/6 + 4.666 418 fr 1 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 58335 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 58335 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 58335 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 58335 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 58335 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 5835 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 5835 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 5835 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 5835 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 5835 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 2799 51.12476 16.83285 5835 56.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 279 55.12476 16.83285 5835 58.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 279 55.12476 16.83285 5835 58.2km/1 bdee 1.7/6 + 3.168 308 +266 km fr -2 <b>R</b> <sup>4</sup> 1 N4240230 279 55.12476 16.83285 5835 58.2km/1 bdee 1.7/6 + 3.168 58.2km/1 bdee 1
(411 N4240230 2799 51.12476 16.83295 5033 54.5kn/h 16469 4.3n/s - 4.608 418 130 446 fr.2 R41 N4240230 2800 51.12476 16.83293 5038m 56.2kn/h 1946 3.9kg/s - 3.9dg 480 4200 46 fr.2 R41 N4240230 2800 51.12489 16.83302 5814m s.45 kn/h 1246g 3.1n/s - 3.4dg 480 422 fr.1
R41 N4240230 2860 51,12476 16.83293 5638m 57.5km/h 22deg 3.9n/5 -3.6dg 41% +22m f: 1 R41 N4240230 2861 51,12489 16.83302 5841m 54.2km/h 2ddeg 3.1n/5 -3.6dg 50% +23m
R41 N4240230 2601 51.12489 16.83302 56341 57.5kr/h 22deg 3.1k/ 5 3.468 56 228 ft 1 R41 N4240230 2601 51.12500 16.83311 5846n 50.6kr/h 26deg 4.2kr/s 3.346 56 200 R41 N4240230 2602 51.12511 15.83311 5846n 50.6kr/h 26deg 6.2kr/s 3.348 188 +248
R41 N4240230 2802 51.12511 16.83320 5852m 49.6km/h 28deg 6.2n/s -3.368 188 +248 R41 N4240230 2803 51.12511 16.83320 5852m 49.6km/h 28deg 6.2n/s -3.6d8 558 +128 f: 2
R41 N4240230 2803 51.12511 16.83320 5852m 49.6km/h 260eg 6.2h/s -3.6d8 55% +128 f; 2 R41 N4240230 2803 51.12523 16.83328 5857m 47.9km/h 24deg 6.1n/s -4.6d8 26% +218 f; 2
R41 N4240230 2804 51.12534 16.83328 5857m 47.9kn/h 23deg 2.8n/s -3.5d8 47% +15R R41 N4240230 2804 51.12534 16.83335 5861n 47.2kn/h 24deg 6.8n/s -3.5d8 47% +15R
41. H4240230 2008 51.12575 10.83303 58809 48.0Km/h 21deg 5.2m/s -3.8dB 64% +178 f: 1
R41 N4240230 2809 51.12587 16.83369 5884m 50.6kn/h 18deg 4.4n/s -4.6d8 46% +178 f:-2 R41 N4240230 2810 51.12599 16.83374 5888m 49.8km/h 12deg 4.9n/s -3.2d8 42% +188 f:-2
G: :# aprsc 2.1.4-g408ed49 15 May 2018 11:36:26 GHT T2NORWAY 80.89.46.248:14580-00>
G: :# aprsc 2.1.4 g4066649 15 Hay 2016 46.5kn/h 9deg 2.8m/s -4.2d8 30% x125 +108 f: 5 R41 N4240230 2811 51.12611 16.83378 5892m 46.5kn/h 9deg 2.8m/s -4.2d8 30% x125 +108 f: 5
R41 N4240230 2812 Crc err -3.2dB 54X x124 -R f: 1
11.4km/h 2deg 4.4h/s 53.000 fild
1 7dp 50% +218 ft 5
R41 N4240230 2815 51.12653 16.83390 5915M 44.6km/h 21deg 5.17/5 53.06 24X X124 +18R R41 N4240230 2816 51.12663 16.83398 5926M 50.6km/h 23deg 5.17/5 -3.06 24X X124 +18R 50.6km/h 23deg 3.3n/5 -4.2d8 56X X125 +8R f; 6
3, 6dB 17% x120 - 4,008 54% to 100 54%
14740230 2819 Cr 5428 59328 51.9km/1 2040 4.80/5 4.008 348 439 ft 6
R41 N4240230 2820 51.12708 10.63437 5936n 51.4kn/h 2008 4.4kn/h 2008 4.4kn/h 2008 4.4kn/h 2008 4.4kn/h 2008 4.1kn/h 2008 4
R41 N4240230 2821 51.12756 16.83459 5952m 48.4Kn/h
R41 N4240230 2821 51.12720 10.83457 5052m 48.4kn/h 13499 5054 R41 N4240230 2824 51.12756 10.83459 5052m 48.4kn/h 13499 5054
FL odb 1

FIGURE: Decoding data (credits: CBK PAN)

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FIGURE: 2nd GS - EU Area/ISS (credits: CBK PAN)

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FIGURE: AllSky.. in a different way (credits: CBK PAN)

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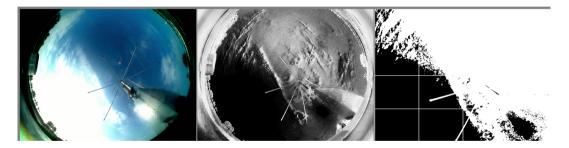


FIGURE: AllSky.. in a different way (credits: CBK PAN)

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FIGURE: Control software (credits: CBK PAN)

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19 76	Cosparil 40119 36508	BRITE-PL 2 CRYOSAT 2	113,78 107,45 212,25	-66,07	12316 11005	-2,14 2,83	Wznoszenie Opadanie	43055	104UED 19/2014	1	, sek. : 1 : •
19 76 2970	Cosparit 40119 36508 35681	BRITE-PL 2 CRYOSAT 2 DEIMOS 1	113,78 107,45 212,25	-66,07 -52,62 -73,28	12316 11005 12885	-2,14 2,83 0,75	Wznoszenie Opadanie Opadanie	43055	DAULI PO 19 (702)	100051	
19 76 2970 118	Cosparit 40119 36508 35681 16903	BRITE-PL 2 CRYOSAT 2 DEIMOS 1 EGS (AJISAI)	113,78 107,45 212,25 202,47	-66,07 -52,62 -73,28 -25,01	12316 11005 12885 3022	-2,14 2,83 0,75 3.02	Wznoszenie Opadanie Opadanie Opadanie	43055	10AULEO 18 (7028	and the second s	
19 76 2970 118 43 3812	Cosparit 40119 36508 35681 16503 27386	BRITE-PL 2 CRYOSAT 2 DEIMOS 1 EGS (AJISAI) ENVISAT	113,78 107,46 212,25 202,47 335,38	-66,07 -52,62 -73,28 -25,01 -68,64	12316 11005 12985 8022 12702	-2,14 2,83 0,75 3,09 -2,16	Wznoszenie Opadanie Opadanie Opadanie Wznoszenie	43055	10AULEO 19.0705	James 1	
19 76 2970 115 43 3812	Cospariti 40119 36508 35601 16503 27386 21574	BRITE-PL 2 CRYOSAT 2 DEIMOS 1 EOS (AJISAI) ENVISAT ERS 1	113,78 107,46 212,25 202,47 335,38 237,91	-66,07 -52,62 -73,28 -25,01 -68,64 -23,64	12316 11005 12885 8022 12702 6687	-2,14 2,83 0,75 3,09 -2,16 5,04	W2noszenie Opadanie Opadanie Opadanie W2noszenie Opadanie	43355	DAMURO 19/020		
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D 19 76 2970 118 43 3812 75 3007 3589 8146	Cosparit 40119 36508 35601 16503 27306 21574 23560 40890 33331 43476	BRITE-PL 2 CRIVOSAT 2 DEIMOS 1 ECS (AJISA) ENVISAT ERS 1 ERS 2 GALILEO 10 (206) CROEVE 1 GRACE-FO 1	113,78 107,46 212,25 202,47 335,38 237,91 13,66 242,05 253,81 324,52	66,07 -52,62 -73,28 -25,04 -68,64 -23,64 -10,49 -80,17 -85,22 -63,89	12316 11005 12885 8002 12702 6087 4017 35853 13382 12016	-2,14 2,83 0,75 3,69 -2,16 5,84 -6,54 -0,09 0,1 -2,84	Winotsenie Opadanie Opadanie Opadanie Opadanie Winotsenie Winotsenie Winotsenie Winotsenie Opadanie	43355	DAN IL FO 19 (702)		
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0 19 76 2970 43 3012 75 3007 3589 8146 8147 4364 2049 192	Cosperie 40119 36508 35601 16508 27386 21574 23560 40890 33331 43476 43477 43114 43701 39634	BRITE-PL 2 CRIVQSAF 2 DEMOS 1 EGS (JUEAL) ENVEAT ERS 1 ERS 2 CALLEC 10 (205) CEDEVE 1 CRACE-FO 1 CRACE-FO 1 CRACE-FO 2 LEEVE X1 LEEVE-X1 LEEVE-X1	113,78 107,46 212,25 202,47 335,38 237,91 13,66 242,05 253,81 324,52 323,77 197,5 271,01 166	66,07 -52,62 -73,28 -23,64 -10,49 -80,17 -85,22 -63,89 -64,69 -75,19 -52,13 -68,89	12316 11005 12885 12702 6667 4017 35853 13382 12016 12090 12841 10783 12624	(2,14 2,63 0,75 3,60 4,16 5,04 6,54 0,09 0,1 (2,74 0,01 (2,74 0,01 (2,74 0,01 (2,74 0,01 (2,74 (0,01)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(2,74)(	Withoutaine Operative Control of the Control Operative Withoutaine Operative Withoutaine Withoutaine Operative Operative Operative Operative	43005	000,070 19,028		
D 19 76 2970 43 3812 75 3007 3519 8146 8147 4364 2049 192 226	Cosparill 40119 36508 35681 16508 27386 21574 23560 40890 33331 43476 43477 43114 43761 39634 41456	BRITE-PL 2 CRY05AT 2 DEMO5 1 ECS (AJISAI) ENVISAT ERS 1 ERS 1 ERS 2 CALLEO 10 (205) CRACE-FO 2 ICRYCE-FO 2 ICRYCE-FO 2 ICEYE-X1 ICEYE-X2 SENTINEL IA SENTINEL IA	113,78 107,46 212,25 202,47 335,38 237,91 13,66 242,05 253,81 324,20 323,85 232,377 197,5 271,01 166 345,84	66,07 -52,62 -73,28 -25,01 -68,64 -23,64 -10,49 -80,17 -45,22 -63,89 -64,69 -75,19 -52,13 -68,89 -13,75	12316 11005 12985 12985 12702 6687 4017 35853 13382 12016 12090 12841 10783 12024 4962	-2,14 -2,03 -0,75 -3,00 -2,16 -5,04 -6,54 -6,54 -6,09 -0,1 -2,74 -0,01 -3,02 -2,74 -0,01 -3,02 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,75 -2,16 -5,58 -2,16 -5,58 -2,16 -5,58 -2,16 -5,58 -2,16 -5,58 -2,16 -5,58 -2,16 -5,58 -2,16 -5,58 -2,75 -2,16 -5,58 -2,75 -2,76 -2,16 -5,58 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,76 -2,	Wooscanie Opdatelie Wooscanie Opdatelie Wooscanie Opdatelie Opdatelie Wooscanie Opdatelie Wooscanie Opdatelie Wooscanie	43000	IAU 170 38 0708		
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D 19 76 2970 118 43 3012 75 3007 3589 8146 8147 4364 2049 192 226 191 9060	Cosparill 40119 36508 35601 16903 27386 21574 23560 40890 33331 43476 43477 43114 43761 39634 43561 40697 42063	BRITE-PL 2 CRY05AT 2 DEMOS 1 ECS (AUSA) ENVEAT ERS 1 ERS 1 ERS 2 CALLEC 10 (205) CR OEYE 1 CRACE-FO 2 ICEYE-X1 ICEYE-X2 SENTINEL 19 SENTINEL 19 SENTINEL 10 SENTINEL 20	113,78 107,46 212,25 202,47 335,38 237,91 13,66 242,05 253,81 324,52 323,77 197,5 271,01 166 345,84 263,4 83,28	66,07 -52,62 -73,28 25,04 -23,64 -23,64 -10,49 64,69 -75,19 -52,13 -68,89 -64,69 -75,19 -52,13 -68,89 -13,75 -35,2 -27,55	12316 11005 12885 12702 6607 4017 35853 13382 12016 12090 12841 10783 12624 4992 11409 7365	-2,14 2,03 0,75 3,60 -2,16 5,84 -0,99 0,1 -2,74 -0,91 -2,74 -0,01 -2,74 -2,74 -0,01 -2,74 -2,74 -0,01 -3,162 -2,74 -2,74 -0,12 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,74 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75 -2,75	Winescalardi Oppdate Oppdate Oppdate Oppdate Oppdate Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version Version V	43035	INU IFO 38 4758		
D 19 76 2970 118 43 3012 75 3007 3589 8146 8147 4364 2049 192 226 191	Cosparill 40119 36508 33601 10603 27386 21574 23560 40890 33331 43476 43477 43114 43701 39634 41456 40697	BRTE-PL-2 CRV05AT2 DEMO51 EC5(LVISA) ER51 ER51 ER51 CR04EF01 CR04EF01 CR04EF01 CR04EF01 CR04EF01 CR04EF01 CR04EF01 SRTTINEL18 SENTINEL18	113,78 107,46 212,25 202,47 335,38 237,91 13,46 242,05 253,81 324,52 323,77 197,5 271,01 166 345,84 263,4	66,07 -52,62 -73,28 25,04 -23,04 -23,04 -10,49 -60,17 -65,22 -63,89 -64,69 -75,19 -52,13 -54,69 -13,75 -55,2	12316 11005 12085 12085 12702 6687 4017 35853 13382 12016 12090 12841 10783 12624 4992 11469	-2,14 2,83 2,83 -2,16 5,54 -0,09 -0,1 -2,54 -2,74 -0,01 -2,74 -0,01 -2,74 -2,74 -2,64 -2,74 -2,64 -5,62 -5,36 -6,62 -5,36 -6,54 -6,54 -6,54 -6,54 -6,54 -6,54 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55 -7,55	Winstanke Oppdate Oppdate Oppdate Oppdate Oppdate Oppdate Oppdate Oppdate Oppdate Oppdate Oppdate	43055	INU IPO 18 028		

## FIGURE: Control software (credits: CBK PAN)

Nazwa sat.	Numer sat.	Aktualność TLI	E Obserwowany.	NORAD ID	Rok Dzień	Zmiennoś	¿ Dzienna zmiana tob.	Wpł. Atm	Typ efemerydy	Nr efemerydy	Inklinacja	Rektascencja	Mimośród	Perygeum	Anomalia	Liczba obiegów	v Liczba o	٩î
ENVISAT	27386	827		02009A	16 275.7320036		00000-0	\$3495-4	0	6666	98.2725	325.2707		80,9005	279,2303	14.37876737	76393	
ENVISAT	27386	618		000004	16 175 4536544	00000000	00000.0	34743.4	0	0001	08.0734	335.0008	0001101	78.3174	281,8139	14.37876741	76389	
ENVISAT	27386	000 Wykre	es inklinacji												251,6102	14,37870615	76364	
ENVISAT	27386						ENVISAT								283,4124	14.3787642	76379	
ENVISAT	27386													_	253,7675	14,3787644	76374	
ENVISAT	27386	1													282,1492	14.37876364	76370	
ENVISAT	27386		~												282,2759	14,378763	76364	
ENVISAT	27386	98.32 -	~												281,7940	14.37876366	76360	
ENVISAT	27386	1	~												281,3579	14,37876369	76356	
ENVISAT	27386	1	7												281,6351	14,37876252	76350	
ENVISAT	27386	1													280,8507	14,3787625	76345	
ENVISAT	27386	98.3 -		1											250,5109	14,37876247	76322	
ENVISAT	27386	- 1													282.3909	14.37878425	76317	
ENVISAT	27366	1													282,0910	14,37876447	76313	
ENVISAT	27386	98,28			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~									-	281.0020	14.37876283	76308	
ENVISAT	27386	98.20				~									283,2777	14,37876914	76303	
ENVISAT	27386	1				~									282,0032	14,37876363	76298	
ENVISAT	27386	1				~									283,3473	14,37876378	76293	
ENVISAT	27386	98.26 -					~								282,1062	14,37876419	76259	
ENVIEAT	27386						~								281,339	14.37876402	76284	
ENVISAT	27386														281,0955	14,37876143	76264	
ENVISAT	27386														281,0074	14.37870007	76250	
ENVISAT		98,24 -													280,3743	14,37879943	76245	
ENVISAT	27386														280,0041	14,37875923	76241	
ENVISAT	27386							1	~						281,0991	14,37875954	76236	
ENVISAT	27386								~						281,971	14,378758	76231	
ENVISAT		98.22 -													279,8108	\$4,37875747	76226	
ENVISAT	27386									S					279,0035	14,37875099	76221	
ENVISAT	27386									~					280,1107	14,37875948	76212	
ENVISAT	27386									~					282,3325	14,37875419	76187	
ENVISAT	27386	90.2 -								~					283,1902	14,37875331	70103	
ENVISAT	27386														282,0011	14,37875313	76178	
ENVISAT	27386	-										_			282,0963	14,37875315	76173	
ENVISAT	27386											~~~			281,9278	14,37875293	76169	
ENVISAT	27386	98.18 -											_		253,5594	14,37875316	76164	
ENVISAT	27386	1													284,0155	14,37875165	76159	
ENVISAT	27386	1												5	283,2719	14,3787914	76104	
ENVISAT	27386	1													283,0549	14,37875139	76149	
ENVISAT	27386		2016-0	1-01			2017-01-01			2018-01-01				2019-01	283,3082	14,37875179	76144	
ENVISAT	27386	045		02009A	16 258,1263656	2 .00000024	00000-0	00534-5	0	9004	98,2743	305,3164	0001245	78,9005	282,0324	14,37875041	76140	
ENVISAT	27386	845		02009A	16 257,7784561	9 .00000015	00000-0	89903-5	0	9997	98.2744	307,9835	0001249	78,3011	281,8311	14,37875118	76135	
ENVISAT	27386	546		02009A	16 237,4308210	2 .00000009	00000-0	92786-6	0	9991	98,2743	307,6483	0001235	78,6534	281,4793	14,37879163	76130	
ENVISAT	27386	846		02009A	16 257,1521714		00000-0	15459-4	0	9994	98.2743	307,3802	0001237	78,0981	281,4351	14,37875165	76126	
ENVIRAT	22388	545		020094	15 235 7545468	00000010	00000-0	10125.4	a	0001	08.2743	335.9751	0001245	70 5552	250 5442	14.3737312	76120	

FIGURE: Control software (credits: CBK PAN)

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM

ヘロト 人間 トメヨト 人間 ト

PC	iczążek p	iredykcji		Kon	iec pres	dykcji		Zazna	cz Predykcjan	Satelita	Efem. (dni)	Początek (UTC)	Kulminacja (UTC)	Koniec (UTC)	Czas	El, min.	EL max.	Min. [km]	Max. [km]	Eřem, nr
stycze	ń	2019	4	ityczeń		1	2019 ≥		1409	ENVISAT	0	2019-01-07 16:26:53	2019-01-07 16:29:33	2019-01-07 10:32:12	00:03:19	20	32	1307	1722	577605
on wto	tro cru	pla sob nie	000	wto śr	0.07W	pia so	b nie		1534	GEO IK	0	2019-01-07 16:27:06	2019-01-07 16:32:11	2019-01-07 18:37:11	00:10:02	20	32	2384	2960	576481
31 1	2 3			1 2			6		1037	ADEOS	0	2019-01-07 16:30:45	2019-01-07 16:33:27	2019-01-07 16:36:10	00:03:25	20	31	1362	1773	576667
7 8		11 12 13		8 9		11 12			1522	GEOEVE 1	0	2019-01-07 16:35:24	2019-01-07 16:38:36	2019-01-07 10:41:50	00:06:26	20	69	735	1572	580164
		18 19 20		15 16			9 20		1496	JASON 2	0	2019-01-07 16:38:01	2019-01-07 16:40:40	2019-01-07 18:45:19	00:09.18	20	34	2039	2661	560137
		25 26 27		22 23			6 27		1523	LANDGAT 8	0	2019-01-07 16:39:59	2019-01-07 16:43:15	2019-01-07 10:46:30	00:05:40	20	ō4	713	1601	582642
28 29	30 31		28	29 30	2 31				1514	JASON	0	2019-01-07 16:55:24	2019-01-07 17:00:18	2019-01-07 17:05:11	00:09:47	20	36	1987	2660	577529
									1509	TOPEX/POSEIDON	0	2019-01-07 16:55:33	2019-01-07 17:01:35	2019-01-07 17:07:43	00:12:11	20	65	1433	2701	576030
	d godzin			Deer	odziny	0.000			1490	ENVISAT	0	2019-01-07 18:05:31	2019-01-07 18:06:44	2019-01-07 18:11:56	00:06:25	20	45	1038	1724	577665
0	agoazii			Dog	loopuly	(010)			1483	LARES	0	2019-01-07 18:16:03	2019-01-07 18:22:27	2019-01-07 18 28 50	00:12.45	20	67	1547	2851	582222
		16							1479	LAGEOS 2	0	2010-01-07 18:21:17	2010-01-07 18:27:51	2019-01-07 18:34:33	00:13:16	20	22	8165	6321	576061
_	_			-v-					1535	GEO IK	0	2019-01-07 18:25:13	2010-01-07 18:32:08	2019-01-07 18:38:59	00:13:46	20	85	1537	2560	576481
) Wybri	ine		🗆 wsl	azana r	100				1500	SARAL	0	2019-01-07 18:28:03	2019-01-07 18:31:13	2019-01-07 18:34:21	00.05.15	20	40	1150	1757	563643
Wszys	a kin		0.64	onoche				0	1407	JASON 2	0	2019-01-07 18:33:46	2010-01-07 18:36:22	2019-01-07 18:42:57	00:09:11	20	33	2058	2662	580137
a moria			_ Gu	o mocine					1494	TERRA SAR X	0	2019-01-07 18:37 25	2019-01-07 18:39:52	2019-01-07 18:42:13	00.04.44	20	01	648	1226	579730
		Pro	dykuj						1515	JASON	0	2019-01-07 18:51:00	2019-01-07 10:57:16	2019-01-07 19:03:21	00:12:12	20	75	1379	2662	577529
									1510	TOPEX/POSEIDON	0	2019-01-07 18:54:13	2010-01-07 18:56:02	2019-01-07 19:03:51	00.09.38	20	35	2045	2702	576030
		0.0							1524	SEASAT 1	0	2010-01-07 10:25:55	2010-01-07 10 29:23	2019-01-07 19 32 51	00.00.56	20	74	763	1687	573386
9 Obset	wowane	2 0.5	nieci		O WSZ	ystikie			1510	DEIMOB 1	0	2019-01-07 19:47:33	2010-01-07 10:46:55	2019-01-07 19:52:18	00:04:46	20	33	1109	1515	561262
Ceznecz.	Cospari	D Nazwa							1501	SARAL	0	2010-01-07 20:07 34	2019-01-07 20.10:35	2019-01-07 20 13 36	00.06.02	20	35	1100	1750	562643
	30431	BRITE-PL							1500	LAGEOS 1	0	2010-01-07 20:09-20	2010-01-07 20:18:17	2019-01-07 20 27:03	00:17:43	20	23	8273	6466	572785
	40119	BRITE-PL 2							1484	LARES	0	2019-01-07 20.14:55	2019-01-07 20.20:48	2019-01-07 20 26:42	00:11:47	20	-95	1858	2862	562222
	22195	LAGEOS 2							1536	GEO IK	0	2010-01-07 20:25-25	2010-01-07 20 29:41	2019-01-07 20 33 55	00.08.30	20	29	2524	2964	576481
	22824	STELLA							1498	JABON 2	0	2019-01-07 20:29:21	2010-01-07 20.35:17	2019-01-07 20:41:11	00:11:50	20	63	1454	2656	560137
	36077	LARES							1016	JASON	0	2010-01-07 20:47:30	2010-01-07 20.52:24	2019-01-07 20 57 11	00.09.35	20	37	1953	2680	577529
	27386	ENVISAT							1511	TOPEX/POSEIDON	0	2019-01-07 20:52:40	2010-01-07 20.57:22	2019-01-07 21:02:03	00.09.23	20	34	2000	2703	576030
	30452	SWARM A							1519	DEIMOS 1	0	2019-01-07 21:24:08	2019-01-07 21:26:43	2019-01-07 21 29.18	00.03.10	20	37	1031	1014	561262
	30451	SWARM B							1493	CRYDSAT 2	0	2010-01-07 22:01:41	2019-01-07 22 05:07	2019-01-07 22:08:31	00:00:50	20	60	735	1635	581616
	30453	SWARM C							1485	LARES	0	2019-01-07 22:17:21	2019-01-07 22 21:09	2019-01-07 22 24:52	00.07.25	20	28	2527	2855	562222
	23560	ERS 2							1400	JASON 2	0	2010-01-07 22:25:05	2010-01-07 22:30:25	2019-01-07 22 35:46	00:10:41	20	-95	1705	2657	580137
	36506	CRYOGAT 2							1512	TOPEX/POSEIDON	0	2019-01-07 22:48:55	2019-01-07 22:54:57	2019-01-07 23:00.56	00:12:01	20	62	1409	2700	576030
	31666	TERRA SAR	Х						1401	STELLA	0	2019-01-07 23:19:28	2019-01-07 23 22:09	2019-01-07 23 24:49	00.03.21	20	31	1353	1790	576333
	33100	JASON 2							1525	ERG 1	0	2019-01-07 23:34:20	2019-01-07 23:37:54	2019-01-07 23:41:21	00.09.53	20	70	795	1677	575870
	30000	SARAL							1007	LAGEOS 1	0	2019-01-07 23:35:46	2019-01-08 00.00:03	2019-01-08 00 23 54	00:48.08	20	79	0910	8527	572785
	16608	EOS JAJISA	0						1520	LANDSAT 7	0	2019-01-07 23:36:35	2019-01-07 23:39:33	2019-01-07 23:42:29	00:03:54	20	43	991	1604	577022
	27944	LARETS							1400	LARES	0	2019-01-08 00:17:41	2019-01-08 00:22:10	2019-01-08 00:26:38	00:08.57	20	30	2354	2855	582222
	06620	LAGEOS 1							1513	TOPEX/POSEIDON	0	2010-01-08 00:45:14	2019-01-08 00.50:45	2019-01-08 00:56:13	00:10.50	20	45	1711	2700	578030
	22076	TOPEX/POS	EIDON						1482	STELLA	0	2019-01-08 00:58:05	2019-01-08 01:01:38	2019-01-08-01.00.08	00:07:03	20	52	1000	1791	576333
	26667	JASON							1492	ERG 2	0	2019-01-08 01:05:44	2019-01-08 01:08:10	2019-01-08 01:10.37	00.04.53	20	68	545	1207	576538
	40607	SENTINEL 2	A						1521	LANDSAT 7	0	2019-01-08 01:14:60	2019-01-05 01:17:11	2019-01-08 01:19:36	00:04:50	20	31	1222	1665	577022
	39634	SENTINEL 1	A						1530	LANDBAT 3	0	2019-01-08 02:08:14	2019-01-08 02:12:10	2019-01-08 02 16:07	00:07.53	20	55	1071	1956	573165
	41240	JASON 3							1487	LARES	0	2019-01-08 02:15:25	2019-01-08 02:21:51	2019-01-08 02:28:15	00:12:50	20	65	1968	2554	582222
	41335	SENTINEL 3	A						1533	LANDBAT 5	0	2019-01-08 02:18:20	2019-01-08 02 18:58	2019-01-08 02:21:38	00:05:18	20	88	548	1298	574257
	41456	SENTINEL 1	8						1028	LANDSAT 2	0	2019-01-08 02:20:53	2019-01-05 02:24:15	2019-01-08 02:27:38	00.00.45	20	36	1403	1982	572555
	40125	GAULED 5 (	261)						1504	LARETS	0	2019-01-08 02:49:10	2019-01-08 02 50:49	2019-01-08 02 52 21	00:03:03	20	23	1441	1579	577820
	10100								1000	lineaa a								1000		Tanana a

### FIGURE: Control software (credits: CBK PAN)

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM

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#### INTRODUCTION AUXILIARY ENVIRONMENT **SOFTWARE** TRACKING TESTS OUESTIONS ANSWEDS?

tu Nazwa Azymut Elewacja>20 Kierunek Wysokość Prędkość SquadCod			Pogoda Online		Połącz	femperatura: n/c	Ciśnienie: n/c	wilg	potność:
8AA Gzekam 322 33 90 10577 m 722 km/h 7152	61,855465		ADSB Online		Odlacz		Status stacji	Zecz	onij wysy
			Kamera Online		Polącz				
			Namera Onine		roger				
14	18								
L	Nr Pres	d Cosparil	Satelita	Efem.(d)	Początek (UTC)	Kulminacja (UTC)	Konlec (UTC)	El.min. El.r	nax. M
-	1490	27355	ENVISAT	-1			2019-01-07 18:11:55		1
	1483	38077	LARE8	0			2019-01-07 18:28:50		
	1479	22195	LAGEOS 2	0			2010-01-07 15:34:33		
	1535	23411	GEO IK	0			2019-01-07 18:38:59		
\$24345, 2401	1500	39036	BARAL	0			2019-01-07 18:34:21		1
	1497	33105	JASON 2	0	2019-01-07 18:33:44	2019-01-07 15:35:22	2019-01-07 15:42:57	30 33	1
	5454	31098	TERRA BAR X	1			2019-01-07 18:42:13		
	1913	20997	JASON	0			2019-01-07 19:03:21		
¥ZZ057. 3494.	1510	22076	TOPEX/POSEIDON	0			2019-01-07 19:03:51		
	1924	10967	SEASAT 1	0	2019-01-07 19.25.55	2019-01-07 19:29.23	2019-01-07 19:32:01		
EAMA KUL	1000	35681	DEIMOG 1	0			2019-01-07 19:52:18		
4718'55, 274a.	1501	39036	BARAL	0			2019-01-07 20:13:36		
	1906	05520	LAGEOS 1	0			2010-01-07 20:27:03		
	5454	38077	LARES	0			2019-01-07 20:28:42		
	1536	23411	GEO IK	0			2010-01-07 20:33:55		
	5490	33105	JASON 2	0	2019-01-07 20.29.21	2019-01-07 20:35:17	2019-01-07 20:41:11	63 63	
	1916	20997	JASON	0			2019-01-07 20:07:11		
	1511	22076	TOPEX/POSEIDON	0	2019-01-07 20.52:40	2019-01-07 20:57:22	2019-01-07 21:02:03	20 34	
- ( )	E 1519	35081	DEIMOB 1	0	2019-01-07 21:24:00	2019-01-07 21:26:43	2019-01-07 21:29:18		
461/ M	5423	30505	CRYOSAT 2	0	2019-01-07 22:01:41	2010-01-07 22:03:07	2010-01-07 22:08:31		
	1485	30077	LARES	0	2019-01-07 22:17:22	2019-01-07 22:21:09	2019-01-07 22:24:52	20 20	
	1420	33105	JASON 2	0	2019-01-07 22 25:00	2019-01-07 22:30.26	2019-01-07 22:35:46	20 495	
	1912	22076	TOPEX/POSEIDON	0	2019-01-07 22:48:58	2019-01-07 22:54:57	2019-01-07 23:00:56	20 62	
	1481	22824	STELLA	-1	2019-01-07 23:19:21	2019-01-07 23:22:09	2019-01-07 23:24:49		
	1929	21074	ERS 1	-4	2019-01-07 23:34:25	2019-01-07 23:37:54	2019-01-07 23:41:21		
Taumer 11204	044353 FS4. 1507	08820	LAGEOB 1	0	2019-01-07 23:35:44	2019-01-08 00:00:03	2019-01-08 00:23:54	20 79	
\· \	439/50 1520	25582	LANDSAT 7	0	2019-01-07 23:36:35	2019-01-07 23:39:33	2019-01-07 23:42:29		
17224 50A	5455	30077	LARES	0			2019-01-08 00:28:38		
	\$24,0C, 50H. 1513	22076	TOPEX/POSEIDON	0			2019-01-08 00:58:13		
1651190, 2024	•/ 1452	22824	STELLA	-1			2019-01-08 01:05:08		
	1492	23590	ER8 2	0	2019-01-08 01:05:44	2019-01-06 01:08:10	2019-01-08 01:10:37		
1998 (h) (1996)	1521	25682	LANDGAT 7	0			2019-01-05 01:12:36		
· ·	1530	10702	LANOSAT 3	0	2019-01-08 02:08:14	2019-01-08 02:12:10	2019-01-08 02:19:07		
140335K 30041	1487	38077	LARES	0			2019-01-08 02:28:10		
	1533	14700	LANDGAT 5	0	2019-01-08 02:16:20	2019-01-06 02:10.58	2019-01-08 02:21:38		
401061	1528	07615	LANDBAT 2	0	2019-01-08 02:20.50	2019-01-08 02:24:16	2019-01-08 02:27:38		
	1504	27966	LARETS	0			2019-01-08 02:52:21		
	1528	27597	ADEOS 2	0	2019-01-08 03:01:38	2019-01-08 03:04:18	2019-01-08 03:08:57	20 30	1
5	1532	13367	LANDSAT 4	0	2019-01-08 03 02:38	2012-01-08 03:04:41	2019-01-08 03:06:48	30 36	5

FIGURE: Control software (credits: CBK PAN)

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INTRODUCTION AUXILIARY ENVIRONMENT SOFTWARE **TRACKING TESTS** QUESTIONS... ANSWERS?



FIGURE: RC8" colimation tests (credits: CBK PAN)

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FIGURE: Target from 250m (credits: CBK PAN)

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FIGURE: INITIAL tracking tests (credits: CBK PAN)

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FIGURE: INITIAL tracking tests (credits: CBK PAN)

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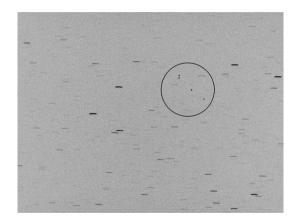


FIGURE: Astra positioning tests (credits: CBK PAN)

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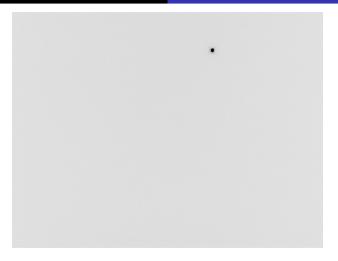


FIGURE: Cryosat2 tracking tests (credits: CBK PAN)

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INTRODUCTION AUXILIARY ENVIRONMENT SOFTWARE **TRACKING TESTS** QUESTIONS... ANSWERS?



### FIGURE: Envisat tracking tests (credits: CBK PAN), CONTRACT TO SERVICE TO SER

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## FIGURE: Spectro INITIAL tests (credits: CBK PAN) $( \mathcal{P} ) ( \mathcal{P}$

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# OTHER ACTIVITIES / COOPERATION

- Airbus Defence and Space
- DLR
- ESA
- EUSST
- POLSA

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FIGURE: Always before leaving for work (credits: me)

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Questions? Answers? :) Thank you for your attention. suchodolski@cbk.poznan.pl plejba@cbk.poznan.pl

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