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

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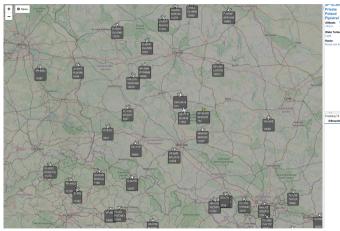


### FIGURE: LASBOR 2nd (credits: CBK PAN)

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ADSB Meteo Meteo... other





| recking 75 eircreft |      |        |        |          |            | Pouse : : L | ist only visible |
|---------------------|------|--------|--------|----------|------------|-------------|------------------|
| Silbourtle          | Flag | Rep.   | ICAO   | Calisign | Reste      | Attacks     | Speed            |
|                     |      |        | 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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ADSB Meteo Meteo... others

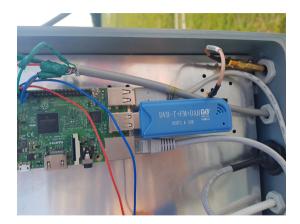


FIGURE: Raspberry (credits: CBK PAN)

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ADSB Meteo Meteo... others



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

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ADSB Meteo Meteo... others



FIGURE: ADSB (credits: CBK PAN)

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ヘロト 人間 ト 人造 ト 人造 ト

ADSB Meteo Meteo... others

| Odczyt [s]   |   |
|--|---|
| 1,431917   |   |
| 0,453098   |   |
| 1,965285   |   |
| 2,421429   |   |
| 7,003569   |   |
| 6,41771  |   |
| 0,45885  |   |
| 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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ADSB Meteo Meteo... others



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

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

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FIGURE: Weather balloon (credits: DWD Stuttgart)

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FIGURE: Educational activities (credits: CBK PAN)

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

ADSB Meteo Meteo... others

| 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<br>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<br>541 N4240230 4795 51.12401 15 0335 5500 4 5600 1 5600 1 5600 1 700 1 560 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<br>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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br><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<br>R41 N4240230 2800 51.12476 16.83293 5038m 56.2kn/h 1946 3.9kg/s - 3.9dg 480 4200 46 fr.2<br>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<br>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<br>R41 N4240230 2601 51.12500 16.83311 5846n 50.6kr/h 26deg 4.2kr/s 3.346 56 200<br>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<br>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<br>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<br>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<br>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<br>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<br>R41 N4240230 2816 51.12663 16.83398 5926M 50.6km/h 23deg 5.17/5 -3.06 24X X124 +18R<br>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<br>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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ADSB Meteo Meteo... others



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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ADSB Meteo Meteo... others

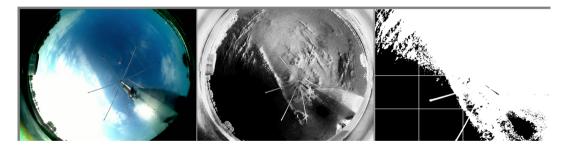


FIGURE: AllSky.. in a different way (credits: CBK PAN)

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FIGURE: Control software (credits: CBK PAN)

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|   |  |  |   |  |   |  | ia Analiza manewrów Teleskop  |          |  |  | ENVISAT                                |
|---|--|--|---|--|---|--|---|----------|--|--|--|
|   |  |  | - ant   |  | -   |  |   |          | wane SAT Obserwacja                    |  | Cras [UT]: 15:4                        |
|   |  | Contractor of the local  |   | h.   | 2   |  | CALLSON COMPANY AND A   | CospariD |  |  | Czas [LT]: 16:45                       |
| 6 E   | Sec. 1   | and the second s | 1100  | - S  |   | A States   | Contraction and the second  | 24277    | ADEOS                                  |  |  |
|   |  |  | 100   |  |   | 19 2250  | and the second sec  | 27597    | ADEOS 2                                |  | Długość: 167,6<br>Szerokosć: 48,81     |
|   |  | S. Martine   | 1000  | 2  | *2  |  | The state of the s  | 39431    | BRITE-PL                               |  | Agymut: 202.1                          |
|   |  | 3  | See.  |  | LAGEOS 2  | 1000   | The second se   | 40119    | BRITE-PL 2                             |  | Elewacja: -25,1                        |
|   |  | 1  |   |  |   |  | and the second second in the second   | 36505    | CRYOGAT 2                              |  |  |
|   |  | 10.00  |   |  | 1000  | Logi Con   | A STATE OF A   | 35681    | DEIMOS 1                               |  | Odległość: 8044a<br>Zbliżanie: 3,092   |
|   |  | 100  | 1052  |  | <b>196</b> 00   | 230.000  | - Contraction   | 40013    | DEMOS 2                                |  | 2011248101 3,092                       |
|   |  |  |   |  | 140   | allow and the  |   | 19908    | EGS (AJISAI)                           |  | Obieg: 1h 55s                          |
|   |  |  | 1/ 28   |  | -   | Station Physics  | No.   | 27386    | ENVISAT                                |  | Apogeum: 1497 b                        |
|   |  | GRACE FO 1   | 1000  | Side.  | SZATINEL SP   | 1000   | Cark Come   | 21574    | ERS 1                                  |  | Perypeum: 1479 b<br>Nielka półoś:1,23  |
|   |  |  |   | 1000   |   | ALL DO .   |   | 23590    | ERS 2                                  |  | Mala półoś: 1,23                       |
|   |  |  |   | Paris de   |   | States 1   |   | 43990    | GALILEO 10 (206)                       |  |  |
|   |  |  | - 28  | 100  |   |  |   | 41175    | GAULEO 11 (200)                        |  | Aktualny TLE:0 dn                      |
|   |  |  |   |  |   | -  |   | 41174    | OALILEO 12 (269)                       |  | X: 4466,632, X'26                      |
|   |  |  |   |  |   |  | BRITE-PL 2 COLUMNS  | 41550    | GAULEO 13 (26A)                        |  | Y: 6219,786, Y'71<br>Z: -1809,942, Z'- |
|   | . 🕯  | LE EO 33 (206) SENTRE  | umer .  |  |   |  |   | 41549    | OALILEO 14 (268)                       |  |  |
|   |  |  |   |  |   |  | CECEVE 1 CRIOG  | 41559    | GALILEO 15 (267)                       |  | 2016-12-19 20                          |
|   |  |  | -4  |  |   |  | DEMOS 1   | 41990    | OAULEO 18 (26C)                        |  |  |
|   | _  |  |   | _  | _   |  |   | 41901    | GALILEO 17 (26D)                       |  | Rzeczywisty                            |
|   |  |  |   |  |   |  |   | 41002    | GALILEO 18 (26E)                       |  |  |
|   |  |  |   |  |   |  |   |          |  |  |  |
|   |  |  |   |  |   |  |   | 43055    | GAULED 19/2055                         |  | sek. : 1 : +                           |
|   | owane  |  |   |  |   |  |   | 43055    | DAULED 18/205                          |  | 3 34%. 0 1 0 4                         |
| D   | Cosparit   |  |   |  |   | Zbliżanie [km/s]   |   | 43055    | DAULED 19/2020                         |  | i sek. : 1 : +                         |
| 19  | Cosparit<br>40119  | BRITE-PL 2   | 113,78  | -66,07   | 12316   | -2,14  | Wznoszenie  | 43055    | 10AULEE0.39.0705                       |  | (sek. 1) [1 1] (*                      |
| 19<br>76  | Cosparil<br>40119<br>36508   | BRITE-PL 2<br>CRYOSAT 2  | 113,78  | -66,07   | 12316<br>11005  | -2,14<br>2,83  | Wznoszenie<br>Opadanie  | 43055    | I GAULEED 39.0725                      |  | [ [sek] ] _ ] +                        |
| 19<br>76<br>2970  | Cosparit<br>40119<br>36508<br>35681  | BRITE-PL 2<br>CRYOSAT 2<br>DEIMOS 1  | 113,78<br>107,45<br>212,25  | -66,07<br>-52,62<br>-73,28   | 12316<br>11005<br>12885   | -2,14<br>2,83<br>0,75  | Wznoszenie<br>Opadanie<br>Opadanie  | 43355    | 00000000000000000000000000000000000000 |  | sek. : 1 : +                           |
| 19<br>76  | Cosparil<br>40119<br>36508   | BRITE-PL 2<br>CRYOSAT 2  | 113,78<br>107,45<br>212,25  | -66,07   | 12316<br>11005  | -2,14<br>2,83  | Wznoszenie<br>Opadanie  | 43055    | 104UED 19/2014                         | 1  | , sek. : 1 : •                         |
| 19<br>76<br>2970  | Cosparit<br>40119<br>36508<br>35681  | BRITE-PL 2<br>CRYOSAT 2<br>DEIMOS 1  | 113,78<br>107,45<br>212,25  | -66,07<br>-52,62<br>-73,28   | 12316<br>11005<br>12885   | -2,14<br>2,83<br>0,75  | Wznoszenie<br>Opadanie<br>Opadanie  | 43055    | DAULI PO 19 (702)                      | 100051   |  |
| 19<br>76<br>2970<br>118   | Cosparit<br>40119<br>36508<br>35681<br>16903   | BRITE-PL 2<br>CRYOSAT 2<br>DEIMOS 1<br>EGS (AJISAI)  | 113,78<br>107,45<br>212,25<br>202,47  | -66,07<br>-52,62<br>-73,28<br>-25,01   | 12316<br>11005<br>12885<br>3022   | -2,14<br>2,83<br>0,75<br>3.02  | Wznoszenie<br>Opadanie<br>Opadanie<br>Opadanie  | 43055    | 10AULEO 18 (7028                       | and the second s |  |
| 19<br>76<br>2970<br>118<br>43<br>3812   | Cosparit<br>40119<br>36508<br>35681<br>16503<br>27386  | BRITE-PL 2<br>CRYOSAT 2<br>DEIMOS 1<br>EGS (AJISAI)<br>ENVISAT   | 113,78<br>107,46<br>212,25<br>202,47<br>335,38  | -66,07<br>-52,62<br>-73,28<br>-25,01<br>-68,64   | 12316<br>11005<br>12985<br>8022<br>12702  | -2,14<br>2,83<br>0,75<br>3,09<br>-2,16   | Wznoszenie<br>Opadanie<br>Opadanie<br>Opadanie<br>Wznoszenie  | 43055    | 10AULEO 19.0705                        | James 1  |  |
| 19<br>76<br>2970<br>115<br>43<br>3812   | Cospariti<br>40119<br>36508<br>35601<br>16503<br>27386<br>21574  | BRITE-PL 2<br>CRYOSAT 2<br>DEIMOS 1<br>EOS (AJISAI)<br>ENVISAT<br>ERS 1  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91  | -66,07<br>-52,62<br>-73,28<br>-25,01<br>-68,64<br>-23,64   | 12316<br>11005<br>12885<br>8022<br>12702<br>6687  | -2,14<br>2,83<br>0,75<br>3,09<br>-2,16<br>5,04   | W2noszenie<br>Opadanie<br>Opadanie<br>Opadanie<br>W2noszenie<br>Opadanie  | 43355    | DAMURO 19/020                          |  |  |
| 19<br>76<br>2970<br>118<br>43<br>3812<br>75   | Cospariti<br>40119<br>36508<br>35601<br>16503<br>27386<br>21574<br>23560   | BRITE-PL 2<br>CRYOSAT 2<br>DEIMOS 1<br>ECS (AJISAI)<br>ENVISAT<br>ERS 1<br>ERS 2   | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,66   | 66,07<br>52,62<br>73,28<br>25,03<br>68,64<br>-23,64<br>-10,49  | 12316<br>11005<br>12885<br>3023<br>12702<br>6687<br>4017  | -2,14<br>2,83<br>0,75<br>3,00<br>-2,16<br>5,84<br>4,54   | Wznoszenie<br>Opadanie<br>Opadanie<br>Wznoszenie<br>Opadanie<br>Wznoszenie  | 43355    | DAM IF D 19 (2020                      |  |  |
| D<br>19<br>76<br>2970<br>110<br>43<br>3812<br>75<br>3007<br>3589  | Cosparili<br>40119<br>36508<br>35601<br>16503<br>27386<br>21574<br>23560<br>40690<br>33331   | BRITE-PL 2<br>CRIVOSAT 2<br>DEIMOS 1<br>EOS (AUISAT)<br>ENVISAT<br>ERS 1<br>ERS 2<br>GALILEO 10 (206)<br>GEOEYE 1  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,46<br>242,05<br>253,81   | 66,07<br>52,62<br>73,28<br>25,04<br>68,64<br>-23,64<br>-10,49<br>-80,17<br>-85,22  | 12316<br>11005<br>12885<br>3002<br>12702<br>6687<br>4017<br>35853<br>13382  | -2,14<br>2,83<br>0,75<br>3,02<br>-2,16<br>5,04<br>-6,54<br>-0,09<br>0,1  | Windstenke<br>Oppdanie<br>Oppdanie<br>Oppdanie<br>Windstenke<br>Windstenke<br>Windstenke<br>Windstenke<br>Oppdanie  | 43355    | DAM IF D 39 (7028                      |  |  |
| D<br>19<br>76<br>2970<br>118<br>43<br>3812<br>75<br>3007<br>3589<br>8146  | Cosparit<br>40119<br>36508<br>35601<br>16503<br>27306<br>21574<br>23560<br>40890<br>33331<br>43476   | BRITE-PL 2<br>CRIVOSAT 2<br>DEIMOS 1<br>ECS (AJISA)<br>ENVISAT<br>ERS 1<br>ERS 2<br>GALILEO 10 (206)<br>CROEVE 1<br>GRACE-FO 1   | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,66<br>242,05<br>253,81<br>324,52   | 66,07<br>-52,62<br>-73,28<br>-25,04<br>-68,64<br>-23,64<br>-10,49<br>-80,17<br>-85,22<br>-63,89  | 12316<br>11005<br>12885<br>8002<br>12702<br>6087<br>4017<br>35853<br>13382<br>12016   | -2,14<br>2,83<br>0,75<br>3,69<br>-2,16<br>5,84<br>-6,54<br>-0,09<br>0,1<br>-2,84   | Winotsenie<br>Opadanie<br>Opadanie<br>Opadanie<br>Opadanie<br>Winotsenie<br>Winotsenie<br>Winotsenie<br>Winotsenie<br>Opadanie  | 43355    | DAN IL FO 19 (702)                     |  |  |
| D<br>19<br>76<br>2970<br>118<br>43<br>3812<br>75<br>3007<br>3589<br>8146<br>8147  | Cosparif<br>40119<br>36508<br>33681<br>16503<br>27386<br>21574<br>23560<br>40690<br>33331<br>43476<br>43477  | BRITE-PL 2<br>CRIVOSAT 2<br>DDIMOS 1<br>EOS (AUSAT)<br>ERS 1<br>ERS 1<br>ERS 2<br>GALLEO 10 (206)<br>GEOEYE 1<br>GRACE-FO 1<br>GRACE-FO 1  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,46<br>242,05<br>253,01<br>324,52<br>323,77   | 66,07<br>52,62<br>73,28<br>25,04<br>68,64<br>-23,64<br>-10,49<br>-80,17<br>-85,22<br>-63,89<br>-64,69  | 12316<br>11005<br>12985<br>12702<br>6687<br>4017<br>35853<br>13382<br>12016<br>12090  | -2,14<br>2,63<br>0,75<br>3,09<br>2,16<br>5,84<br>-6,54<br>-0,09<br>0,1<br>2,84<br>-2,74  | Winotenie<br>Opdanie<br>Opdanie<br>Opdanie<br>Winotenie<br>Winotenie<br>Winotenie<br>Winotenie<br>Winotenie<br>Winotenie<br>Winotenie   | 43355    |  |  |  |
| 19<br>76<br>2970<br>110<br>43<br>3812<br>75<br>3007<br>3589<br>8146<br>8147<br>4364   | Cosperif<br>40119<br>36508<br>35681<br>16503<br>27386<br>21574<br>23560<br>40890<br>33331<br>43476<br>43477<br>43114   | BRITE-PL 2<br>CRYOSAT 2<br>DEIMOS 1<br>ECS (AUSA)<br>ENVISAT<br>ERS 1<br>ERS 2<br>GALLEO 10 (206)<br>GEOEYE 1<br>GAALEO 10 (206)<br>GEOEYE 1<br>GAALE-FO 1<br>CRACE-FO 2<br>ICEYE-X1   | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,66<br>242,05<br>253,81<br>324,52<br>323,77<br>197,5  | 66,07<br>-52,62<br>-73,28<br>25,01<br>-68,64<br>-23,64<br>-10,49<br>-80,17<br>-85,22<br>-63,89<br>-64,69<br>-75,19   | 12316<br>11005<br>12885<br>1022<br>12702<br>6607<br>4017<br>35853<br>13382<br>12016<br>12090<br>12841                                     | -2,14<br>2,83<br>0,75<br>3,00<br>-2,16<br>5,50<br>-0,09<br>0,1<br>-2,84<br>-2,74<br>-0,01  | Wasspanie Vanospanie Opdataie Opdataie Opdataie Opdataie Vanospanie Wasspanie Wasspanie Wasspanie Wasspanie Wasspanie Wasspanie Wasspanie Vanospataia   | 43000    | Insultro 31 arcte                      |  |  |
| 19<br>76<br>2970<br>118<br>43<br>3812<br>75<br>3007<br>3589<br>8146<br>8147<br>4364<br>2049                                   | Cosperie<br>40119<br>36508<br>35601<br>16503<br>27305<br>21574<br>23560<br>40890<br>33331<br>43476<br>43477<br>43114<br>43701                                      | BRITE-PL 2<br>CRY058AT 2<br>DEMOS 1<br>EGS (AURSA)<br>ERVISAT<br>ERS 1<br>ERS 2<br>GAULEO 10 (2005)<br>CROCK 1<br>GRACE-FO 1<br>GRACE-FO 2<br>ICEYTE-X1<br>ICEYTE-X2   | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,66<br>242,05<br>253,81<br>324,52<br>323,77<br>197,5<br>271,01                                    | 66,07<br>-52,62<br>-73,28<br>-25,64<br>-68,64<br>-23,64<br>-10,49<br>-80,17<br>-85,22<br>-63,89<br>-64,69<br>-75,19<br>-52,13  | 12316<br>11005<br>12885<br>12702<br>6667<br>4017<br>35853<br>13382<br>12016<br>12090<br>12090<br>12094<br>10783                           | (2,14<br>2,63<br>0,75<br>3,50<br>(2,16<br>5,64<br>(0,59<br>0,09<br>0,1<br>(2,74<br>(0,01<br>2,84<br>(0,01<br>3,62  | Witestanen Opperfante Opperfante Opperfante Opperfante Opperfante Opperfante Opperfante Witestanene Opperfante Witestanene Opperfante Opperfant  | 43000    | Гемитео за лося.<br>р                  |  |  |
| 0<br>19<br>76<br>2970<br>43<br>3012<br>75<br>3007<br>3589<br>8146<br>8147<br>4364<br>2049<br>192                              | Cosperie<br>40119<br>36508<br>35601<br>16508<br>27386<br>21574<br>23560<br>40890<br>33331<br>43476<br>43477<br>43114<br>43701<br>39634                             | BRITE-PL 2<br>CRIVQSAF 2<br>DEMOS 1<br>EGS (JUEAL)<br>ENVEAT<br>ERS 1<br>ERS 2<br>CALLEC 10 (205)<br>CEDEVE 1<br>CRACE-FO 1<br>CRACE-FO 1<br>CRACE-FO 2<br>LEEVE X1<br>LEEVE-X1<br>LEEVE-X1  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,66<br>242,05<br>253,81<br>324,52<br>323,77<br>197,5<br>271,01<br>166                             | 66,07<br>-52,62<br>-73,28<br>-23,64<br>-10,49<br>-80,17<br>-85,22<br>-63,89<br>-64,69<br>-75,19<br>-52,13<br>-68,89  | 12316<br>11005<br>12885<br>12702<br>6667<br>4017<br>35853<br>13382<br>12016<br>12090<br>12841<br>10783<br>12624                           | (2,14<br>2,63<br>0,75<br>3,60<br>4,16<br>5,04<br>6,54<br>0,09<br>0,1<br>(2,74<br>0,01<br>(2,74<br>0,01<br>(2,74<br>0,01<br>(2,74<br>0,01<br>(2,74<br>(0,01)(2,74)(   | Withoutaine<br>Operative<br>Control of the Control<br>Operative<br>Withoutaine<br>Operative<br>Withoutaine<br>Withoutaine<br>Operative<br>Operative<br>Operative<br>Operative   | 43005    | 000,070 19,028                         |  |  |
| D<br>19<br>76<br>2970<br>43<br>3812<br>75<br>3007<br>3519<br>8146<br>8147<br>4364<br>2049<br>192<br>226                       | Cosparill<br>40119<br>36508<br>35681<br>16508<br>27386<br>21574<br>23560<br>40890<br>33331<br>43476<br>43477<br>43114<br>43761<br>39634<br>41456                   | BRITE-PL 2<br>CRY05AT 2<br>DEMO5 1<br>ECS (AJISAI)<br>ENVISAT<br>ERS 1<br>ERS 1<br>ERS 2<br>CALLEO 10 (205)<br>CRACE-FO 2<br>ICRYCE-FO 2<br>ICRYCE-FO 2<br>ICEYE-X1<br>ICEYE-X2<br>SENTINEL IA<br>SENTINEL IA  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,66<br>242,05<br>253,81<br>324,20<br>323,85<br>232,377<br>197,5<br>271,01<br>166<br>345,84        | 66,07<br>-52,62<br>-73,28<br>-25,01<br>-68,64<br>-23,64<br>-10,49<br>-80,17<br>-45,22<br>-63,89<br>-64,69<br>-75,19<br>-52,13<br>-68,89<br>-13,75                            | 12316<br>11005<br>12985<br>12985<br>12702<br>6687<br>4017<br>35853<br>13382<br>12016<br>12090<br>12841<br>10783<br>12024<br>4962          | -2,14<br>-2,03<br>-0,75<br>-3,00<br>-2,16<br>-5,04<br>-6,54<br>-6,54<br>-6,09<br>-0,1<br>-2,74<br>-0,01<br>-3,02<br>-2,74<br>-0,01<br>-3,02<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,75<br>-2,16<br>-5,58<br>-2,16<br>-5,58<br>-2,16<br>-5,58<br>-2,16<br>-5,58<br>-2,16<br>-5,58<br>-2,16<br>-5,58<br>-2,16<br>-5,58<br>-2,16<br>-5,58<br>-2,75<br>-2,16<br>-5,58<br>-2,75<br>-2,76<br>-2,16<br>-5,58<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2,76<br>-2, | Wooscanie<br>Opdatelie<br>Wooscanie<br>Opdatelie<br>Wooscanie<br>Opdatelie<br>Opdatelie<br>Wooscanie<br>Opdatelie<br>Wooscanie<br>Opdatelie<br>Wooscanie  | 43000    | IAU 170 38 0708                        |  |  |
| D<br>19<br>76<br>2970<br>118<br>43<br>3012<br>75<br>3007<br>3589<br>8146<br>8147<br>4364<br>2049<br>192<br>226<br>191         | Cosparill<br>40119<br>36508<br>33601<br>10603<br>27386<br>21574<br>23560<br>40890<br>33331<br>43476<br>43477<br>43114<br>43701<br>39634<br>41456<br>40697          | BRTE-PL-2<br>CRV05AT2<br>DEMO51<br>EC5(LVISA)<br>ER51<br>ER51<br>ER51<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>SRTTINEL18<br>SENTINEL18  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,46<br>242,05<br>253,81<br>324,52<br>323,77<br>197,5<br>271,01<br>166<br>345,84<br>263,4          | 66,07<br>-52,62<br>-73,28<br>25,04<br>-23,04<br>-23,04<br>-10,49<br>-60,17<br>-65,22<br>-63,89<br>-64,69<br>-75,19<br>-52,13<br>-54,69<br>-13,75<br>-55,2                    | 12316<br>11005<br>12085<br>12085<br>12702<br>6687<br>4017<br>35853<br>13382<br>12016<br>12090<br>12841<br>10783<br>12624<br>4992<br>11469 | -2,14<br>2,83<br>2,83<br>-2,16<br>5,54<br>-0,09<br>-0,1<br>-2,54<br>-2,74<br>-0,01<br>-2,74<br>-0,01<br>-2,74<br>-2,74<br>-2,64<br>-2,74<br>-2,64<br>-5,62<br>-5,36<br>-6,62<br>-5,36<br>-6,54<br>-6,54<br>-6,54<br>-6,54<br>-6,54<br>-6,54<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55  | Winstanke<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate  | 43000    | IAU IFO 31 0758                        |  |  |
| D<br>19<br>76<br>2970<br>118<br>43<br>3012<br>75<br>3007<br>3589<br>8146<br>8147<br>4364<br>2049<br>192<br>226<br>191<br>9060 | Cosparill<br>40119<br>36508<br>35601<br>16903<br>27386<br>21574<br>23560<br>40890<br>33331<br>43476<br>43477<br>43114<br>43761<br>39634<br>43561<br>40697<br>42063 | BRITE-PL 2<br>CRY05AT 2<br>DEMOS 1<br>ECS (AUSA)<br>ENVEAT<br>ERS 1<br>ERS 1<br>ERS 2<br>CALLEC 10 (205)<br>CR OEYE 1<br>CRACE-FO 2<br>ICEYE-X1<br>ICEYE-X2<br>SENTINEL 19<br>SENTINEL 19<br>SENTINEL 10<br>SENTINEL 20  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,66<br>242,05<br>253,81<br>324,52<br>323,77<br>197,5<br>271,01<br>166<br>345,84<br>263,4<br>83,28 | 66,07<br>-52,62<br>-73,28<br>25,04<br>-23,64<br>-23,64<br>-10,49<br>64,69<br>-75,19<br>-52,13<br>-68,89<br>-64,69<br>-75,19<br>-52,13<br>-68,89<br>-13,75<br>-35,2<br>-27,55 | 12316<br>11005<br>12885<br>12702<br>6607<br>4017<br>35853<br>13382<br>12016<br>12090<br>12841<br>10783<br>12624<br>4992<br>11409<br>7365  | -2,14<br>2,03<br>0,75<br>3,60<br>-2,16<br>5,84<br>-0,99<br>0,1<br>-2,74<br>-0,91<br>-2,74<br>-0,01<br>-2,74<br>-2,74<br>-0,01<br>-2,74<br>-2,74<br>-0,01<br>-3,162<br>-2,74<br>-2,74<br>-0,12<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,74<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75<br>-2,75   | Winescalardi<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>Version<br>V | 43035    | INU IFO 38 4758                        |  |  |
| D<br>19<br>76<br>2970<br>118<br>43<br>3012<br>75<br>3007<br>3589<br>8146<br>8147<br>4364<br>2049<br>192<br>226<br>191         | Cosparill<br>40119<br>36508<br>33601<br>10603<br>27386<br>21574<br>23560<br>40890<br>33331<br>43476<br>43477<br>43114<br>43701<br>39634<br>41456<br>40697          | BRTE-PL-2<br>CRV05AT2<br>DEMO51<br>EC5(LVISA)<br>ER51<br>ER51<br>ER51<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>CR04EF01<br>SRTTINEL18<br>SENTINEL18  | 113,78<br>107,46<br>212,25<br>202,47<br>335,38<br>237,91<br>13,46<br>242,05<br>253,81<br>324,52<br>323,77<br>197,5<br>271,01<br>166<br>345,84<br>263,4          | 66,07<br>-52,62<br>-73,28<br>25,04<br>-23,04<br>-23,04<br>-10,49<br>-60,17<br>-65,22<br>-63,89<br>-64,69<br>-75,19<br>-52,13<br>-54,69<br>-13,75<br>-55,2                    | 12316<br>11005<br>12085<br>12085<br>12702<br>6687<br>4017<br>35853<br>13382<br>12016<br>12090<br>12841<br>10783<br>12624<br>4992<br>11469 | -2,14<br>2,83<br>2,83<br>-2,16<br>5,54<br>-0,09<br>-0,1<br>-2,54<br>-2,74<br>-0,01<br>-2,74<br>-0,01<br>-2,74<br>-2,74<br>-2,64<br>-2,74<br>-2,64<br>-5,62<br>-5,36<br>-6,62<br>-5,36<br>-6,54<br>-6,54<br>-6,54<br>-6,54<br>-6,54<br>-6,54<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55<br>-7,55  | Winstanke<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>Oppdate<br>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)

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM

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

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FIGURE: INITIAL tracking tests (credits: CBK PAN)

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM

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FIGURE: INITIAL tracking tests (credits: CBK PAN)

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM

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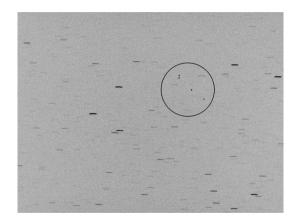


FIGURE: Astra positioning tests (credits: CBK PAN)

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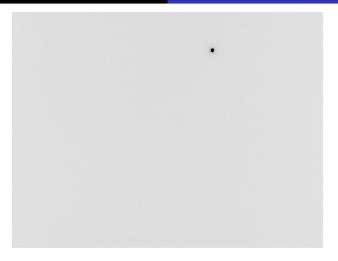


FIGURE: Cryosat2 tracking tests (credits: CBK PAN)

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



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

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM



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

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM

# OTHER ACTIVITIES / COOPERATION

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

SHORTNAME CBK PAN BOROWIEC SECOND SATELLITE TRACKING SYSTEM

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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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## TABLE OF CONTENST

## **INTRODUCTION**

- Twins
- **2** Auxiliary environment
  - ADSB
  - Meteo
  - Meteo... others
- **3** Software
- **TRACKING TESTS**
- QUESTIONS... ANSWERS?

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