JCET Station Performance Assessment Tools for the ILRS Stations

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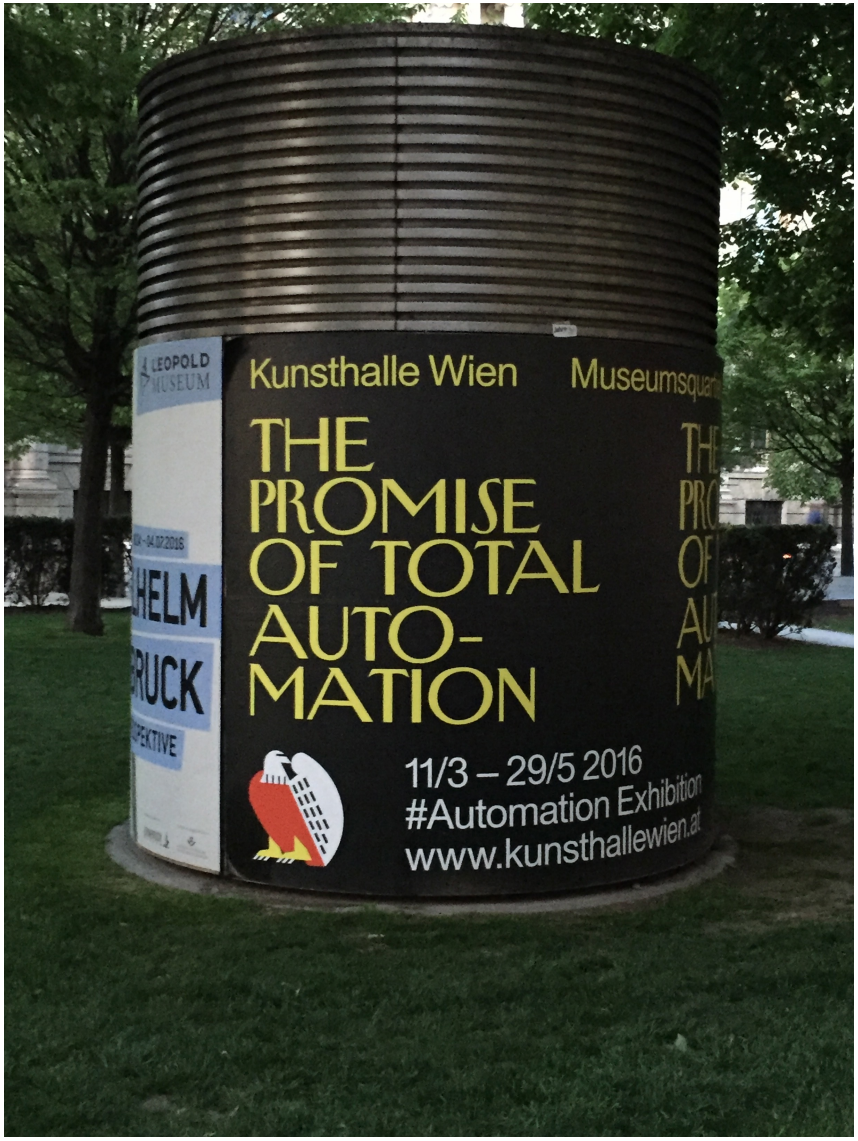
Total Automation of SLR Data Processing

- All of our products are the result of automated processing on a daily and weekly basis
- Human intervention is only necessary in special occasions when there is a breakdown of the network or the processing CPUs



SLR Data Processing for QC Products

- We collect all SLR data for the entire year from CDDIS daily;
- We analyze on a daily basis all data from LAGEOS 1 & 2, LARES, ETALON 1 & 2, STARLETTE, and AJISAI in separate 7^d arcs;
- The LAGEOS 1 & 2, and ETALON 1 & 2 analysis generates our official DAILY products and **a weekly average** of the systematic errors for all stations;
- Through a subsequent reanalysis we generates the systematic error series adjusting for each station **pass-by-pass estimate**;
- A report is compiled with a leading section that provides general information, followed by sections, one per station, with one-line entries for each pass, with the estimated statistics (raw RMS, precision estimate, bias and std. dev. of the bias, timing bias and std. dev., etc.);
- The report is emailed to stations upon request and archived at CDDIS

JCET SLR Data QC Products

1. ASC product results archived daily for QC of analysis products (for analysts)
   - Position and EOP offsets from official TRF and IERS EOP series for all AC/CC
   - Statistics of AC performance wrt ITRF and to the combined products
   - Station position and EOP evolution over time from ILRS standards
2. Weekly arc analysis with single set of weekly-averaged systematics (far more stable estimates compared to the pass-by-pass QC product)
   - Systematic measurement errors archived and visualized online
3. Data analysis for LAGEOS 1 & 2, ETALON 1 & 2 daily for rapid QC:
   - QC report for past 7 days with pass-by-pass systematics generated daily
   - Report submitted to CDDIS and upon request emailed to stations
   - Reports archived on CDDIS and JCET data base for visualization
   - QC Viewer s/w package for all QC Reports (**soon to be online!!!**)
4. **Data yield for all active sites in the GLTN**
5. **Station Systematic Error PP results online (preliminary version)**
6. Station History Change Logs online in data base (updated daily)
7. CRD-NP data content archived online, several parameters and flags are in the archive & can be visualized by station over time for all available pass segments

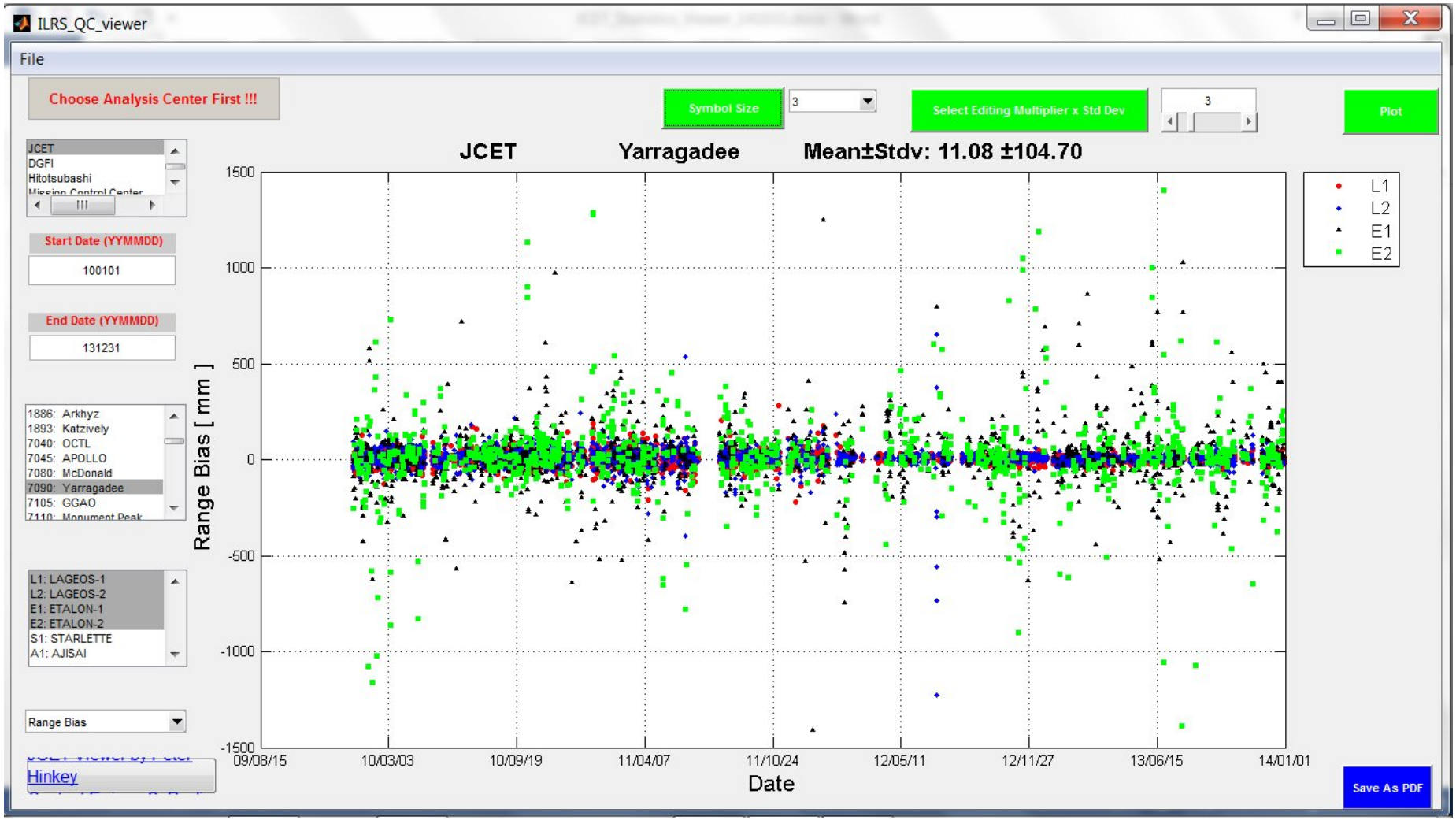
QC Report Header

```
# @161011
# @Data span 161004-161011
# @contact epavlis@umbc.edu
# @website  http://geodesy.jcet.umbc.edu/
# ITRF used:   SLRF2008    (http://ilrs.gsfc.nasa.gov/working_groups/awg/SLRF2008.html)
# @version 1.0
#
# each line contains:
#
# STA ID           = site name
# YY/MM/DD HH:MM   = pass starting time
# SAT              = satellite name (L1: LAGEOS1; L2: LAGEOS2; E1: ETALO1; E2:ETALO2; S1: STARLETTE; A1: AJISAI; LR: LARES
# GOD OBS          = number of good normal points
# RAW RMS          = residual RMS before editing & bias application
# PREC EST         = post-fit scattering rms
# RANGE BIAS       = estimated range bias
# RANGE BIAS SIGMA = estimated range bias sigma
# TIME BIAS        = estimated time bias
# TIME BIAS SIGMA  = estimated time bias sigma
# PASS DUR         = pass duration
# EDIT OBS         = number of bad normal points
# CALIB+ MEAN      = mean Applied System Delay (ILRS FR format cols 97-104)
# CALIB SDEV       = mean System Calibration Method (ILRS FR format cols 126)
# CALIB SHIFT+     = mean Root Mean Square (ILRS FR format cols 111-114)
# STPASS RMS       = mean Pass RMS (ILRS FR format cols 58-64)
# TEMP             = mean surface temperature [K]
# HUM              = mean relative humidity of surface %
# PRES             = mean pressure [hPa]
# WLEN             = walelength [nm]
# SCH              = System Change Indicator (ILRS FR format cols 127)
# SCI              = System Configuration (ILRS FR format cols 128)
# DRF              = Data Release Flag (ILRS FR format cols 130)
# ELEVATION MAX    = maximum elevation for pass [degrees]
# ELEVATION MIN    = minimum elevation for pass [degrees]
#
```

QC Report Body (typical part)

```
#
#7941 Matera  12734S008      GOOD       RAW      PREC     RANGE     RANGE     TIME     TIME  PASS  EDIT   CALIB+   CALIB  CALIB++ STPASS   TEMP    HUM    PRES    WLEN  S S D      ELEVATION
#                            OBS       RMS       EST      BIAS      BIAS     BIAS      BIAS   DUR   OBS     MEAN    SDEV    SHIFT    RMS    [K]      %    [hPa]    [nm]  C C R      MAX      MIN
#STA ID YY/MM/DD HH:MM SAT             [mm]      [mm]      [mm]     SIGMA     [us]     SIGMA [MIN]           [mm]    [mm]     [mm]   [mm]                                H I F    [degrees]
#
#
79417701 16/10/04 08:03 L2    18        6.0       1.5      -5.8       5.2     -0.9       2.5     0      0  35299 E      1       0 P      5   291.2   84.6   962.4   532.0  9 1 0     55.0     23.8
79417701 16/10/05 02:03 L2    14        5.9       0.9       5.8       3.1      6.7       2.2     0      0  35297 E      1       0 P      4   284.9   88.8   959.5   532.0  7 4 0     65.6     33.2
79417701 16/10/05 10:48 E2     4      103.7       1.4    -103.7     443.4     -0.8      78.7     0      0  35299 E      1       0 P     11   286.3   52.4   960.2   532.0  0 3 0     57.3     51.8
79417701 16/10/05 11:19 E2     4      106.7       0.9    -106.7     433.3     -0.6      78.6     0      0  35299 E      1       0 P     10   290.8   45.8   959.9   532.0  0 3 0     69.7     64.7
79417701 16/10/05 11:59 L1    19       16.5       1.6     -16.4       3.2      7.0       2.1     0      0  35299 E      1       0 P      4   290.9   38.4   959.6   532.0  9 1 0     51.1     21.3
79417701 16/10/05 15:55 L1     6       13.7       1.6      13.6       4.9      2.7       3.7     0      0  35297 E      1       0 P      5   287.9   42.2   959.4   532.0  9 1 0     57.5     42.9
79417701 16/10/05 18:59 L1     8       22.0       1.9      21.9       5.6      5.5       3.1     0      0  35295 E      1       0 P      4   284.2   65.8   960.1   532.0  9 1 0     35.0     21.3
79417701 16/10/05 22:35 L1    14        3.4       2.0       2.7       2.8     -3.1       1.9     0      0  35295 E      1       0 P      4   282.5   72.2   960.0   532.0  7 4 0     67.9     20.0
79417701 16/10/06 00:05 L2     9       12.9       0.8      12.9       3.9      8.1       2.7     0      0  35295 E      1       0 P      3   282.5   73.5   959.4   532.0  9 1 0     78.5     33.9
79417701 16/10/06 01:57 L1    13        4.2       2.0       3.6       4.6     -6.5       2.5     0      0  35296 E      1       0 P      4   282.7   69.5   958.8   532.0  7 4 0     39.2     25.8
79417701 16/10/06 08:09 E2     2      108.6       7.1    -108.4     322.9     -0.5      78.9     0      0  35298 E      1       0 P     11   287.4   66.0   958.6   532.0  5 1 0     42.2     41.3
79417701 16/10/06 08:17 L2     7        5.2       3.1       4.1       6.6      3.1       2.5     0      0  35298 E      1       0 P      5   287.7   65.6   958.6   532.0  9 1 0     47.6     22.9
79417701 16/10/06 09:04 E2     6      152.7       2.8    -152.7     408.3     -0.1      78.9     0      0  35299 E      1       0 P     10   288.8   65.0   958.5   532.0  5 1 0     60.6     55.0
79417701 16/10/06 09:37 E2     6      146.0       2.8    -145.9     414.2      1.1      78.8     0      0  35299 E      1       0 P     10   288.8   65.0   958.5   532.0  5 1 0     60.6     55.0
79417701 16/10/07 15:12 E1     2       30.4       0.9      30.4      62.7      0.1      40.5     0      0  35297 E      1       0 P     10   291.9   68.5   952.3   532.0  5 1 0     48.5     47.8
79417701 16/10/08 08:55 L2     7       13.7       1.1     -13.7       8.0      0.5       3.9     0      0  35298 E      1       0 P      4   288.1   76.0   960.0   532.0  1 1 0     39.1     20.1
79417701 16/10/08 11:35 L1    15        3.0       2.4       1.8       4.8     -1.9       2.9     0      0  35298 E      1       0 P      4   290.3   62.6   959.9   532.0  1 1 0     42.5     20.8
79417701 16/10/08 13:58 E1     2       10.3       1.3      10.2      48.0      0.2      40.5     0      0  35297 E      1       0 P     11   291.6   45.0   959.8   532.0  1 1 0     70.0     69.9
79417701 16/10/09 12:37 E1     1  --------  --------  --------  --------  ------  ------  ----      0  35299 E      1       0 P     12   294.6   59.0   960.2   532.0  1 1 0     76.7     76.7
79417701 16/10/09 13:53 L1     3        9.0       8.7      -2.4       6.6    -25.9       8.9     0      0  35299 E      1       0 P      5   291.6   88.0   959.9   532.0  1 1 0     81.6     73.4
79417701 16/10/10 10:54 E1     4       92.3       2.9     -92.3     196.6     -4.4      39.8     0      0  35299 E      1       0 P     10   293.5   66.3   956.0   532.0  1 1 0     68.1     64.3
79417701 16/10/10 11:24 E1     4      102.9       1.2    -102.8     202.4      1.4      40.1     0      0  35300 E      1       0 P     11   294.1   63.3   955.8   532.0  1 1 0     56.4     49.9
79417701 16/10/10 15:49 L1    13       12.7       2.0     -12.5       5.4      5.1       2.5     0      0  35299 E      1       0 P      3   291.2   64.9   955.6   532.0  1 1 0     52.4     27.7
79417701 16/10/10 18:53 L2     7       21.9       1.2     -21.9      14.1      0.8       5.2     0      0  35297 E      1       0 P      4   288.5   75.3   956.4   532.0  1 1 0     24.1     21.8
79417701 16/10/10 19:31 L1     2       41.8       0.6     -41.8      12.2      0.8      11.5     0      0  35297 E      1       0 P      3   287.3   89.0   956.4   532.0  1 1 0     35.6     34.9
#
#
#8834 Wettzell  14201S018      GOOD       RAW      PREC     RANGE     RANGE     TIME     TIME  PASS  EDIT   CALIB+   CALIB  CALIB++ STPASS   TEMP    HUM    PRES    WLEN  S S D      ELEVATION
#                            OBS       RMS       EST      BIAS      BIAS     BIAS      BIAS   DUR   OBS     MEAN    SDEV    SHIFT    RMS    [K]      %    [hPa]    [nm]  C C R      MAX      MIN
#STA ID YY/MM/DD HH:MM SAT             [mm]      [mm]      [mm]     SIGMA     [us]     SIGMA [MIN]           [mm]    [mm]     [mm]   [mm]                                H I F    [degrees]
#
#
88341001 16/10/04 22:19 L2     5        7.1       4.7       5.3       4.1      8.7       2.8     0      0  17858 I      5       1 P     13   279.8   86.0   958.0   532.0  1 2 0     53.6     41.6
88341001 16/10/05 00:05 L1     3       10.3       0.5      10.3       4.4     -5.7       2.8     0      0  17858 I      5       1 P     15   278.4   95.0   957.7   532.0  1 2 0     81.5     47.1
88341001 16/10/05 02:05 L2     4        4.5       3.6      -2.6      13.7      0.4       7.2     0      0  17857 I      5       0 P      8   279.1   86.0   957.0   532.0  1 2 0     54.3     40.9
88341001 16/10/10 00:18 L1     1  --------  --------  --------  --------  ------  ------  ----      0  17858 I      5       0 P     27   277.3   98.0   951.6   532.0  1 2 0     72.8     72.8
88341001 16/10/10 01:46 E2     2      674.4       0.7    -674.3    1255.9     -0.6      78.8     0      0  16802 I     10       0 P     35   277.1   99.0   951.4   532.0  1 2 0     57.4     54.7
#
```

JCET QC Viewer s/w (soon web app!!!)



QC Viewer Supported Reports:

All Reports Contributing to the Monthly/Quarterly Report Card are Supported

DGFI – Data files for the Deutsches Geodaetisches Forschungsinstitut Analysis Center (AC). The online source for these files is http://ilrs.dgfi.badw.de/fileadmin/quality/weekly_biases/ Last updated 8/14/2014

JCET – Date files for the Joint Center for Earth Systems Technology Analysis Center. The online source for these files is ftp://cddis.gsfc.nasa.gov/pub/reports/slrjcet/ Last updated 8/14/2014

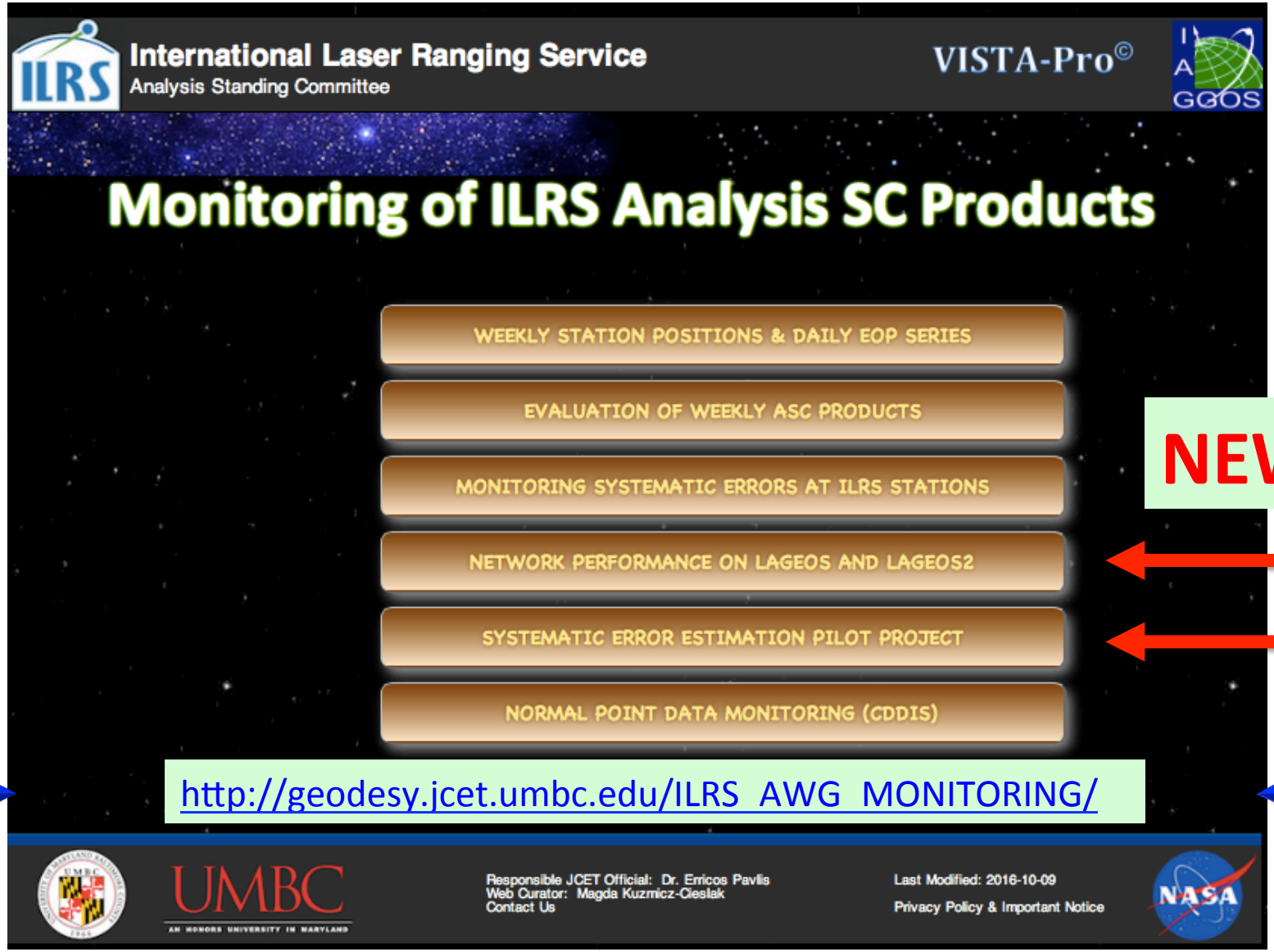
SLRCSR – Data files for the Center for Space Research Analysis Center. The online source for these files is ftp://cddis.gsfc.nasa.gov/pub/reports/slrcsr/ Last updated 8/14/2014 DISCONTINUED

SLRSAO – Data files for the Shanghai Astronomical Observatory Analysis Center. The online source for these files is ftp://cddis.gsfc.nasa.gov/pub/reports/slrsao/ Last updated 8/14/2014

SLRMCC – Data files for the Mission Control Center Analysis Center. The online source for these files is ftp://cddis.gsfc.nasa.gov/pub/reports/slrmcc/ Last updated 8/14/2014

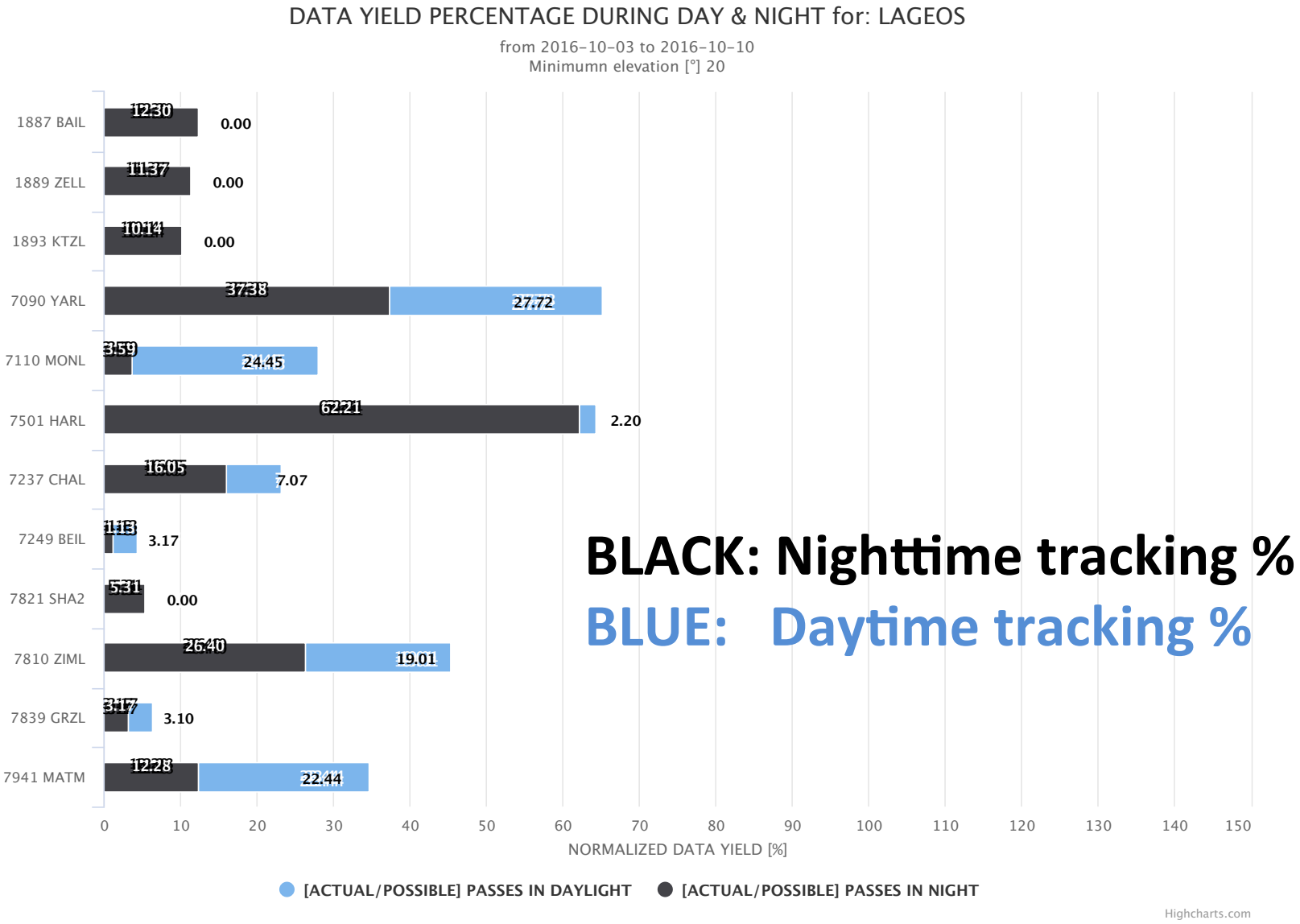
SLRHITU – Data files for the Hitotsubashi Analysis Center. The online source for these files is ftp://cddis.gsfc.nasa.gov/pub/reports/slrhitu/ Last updated 8/14/2014

JCET ASC Products Monitoring Portal



NEW!!!

Network Performance: % Efficiency (Day/night)

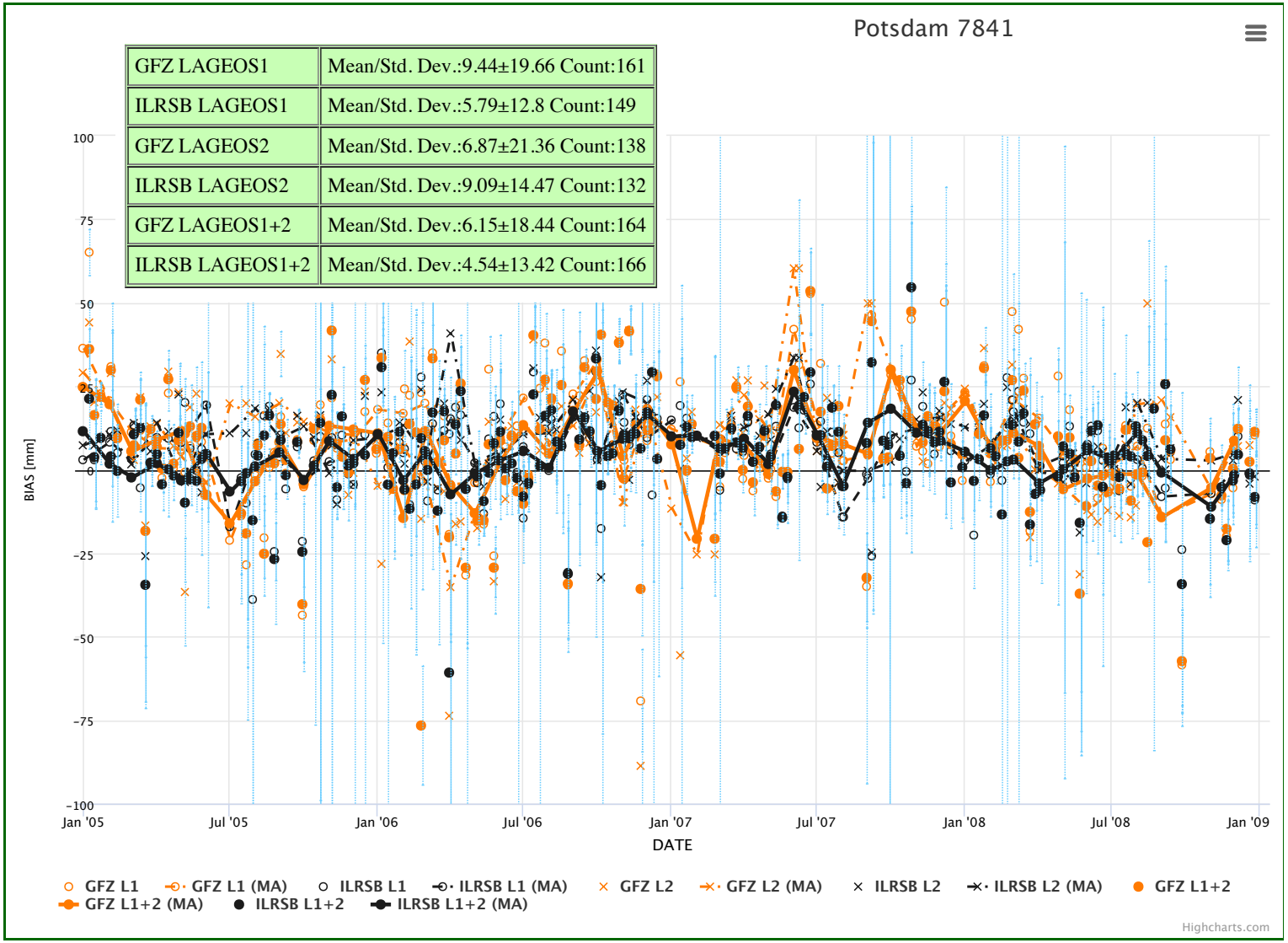


BLACK: Nighttime tracking %

BLUE: Daytime tracking %

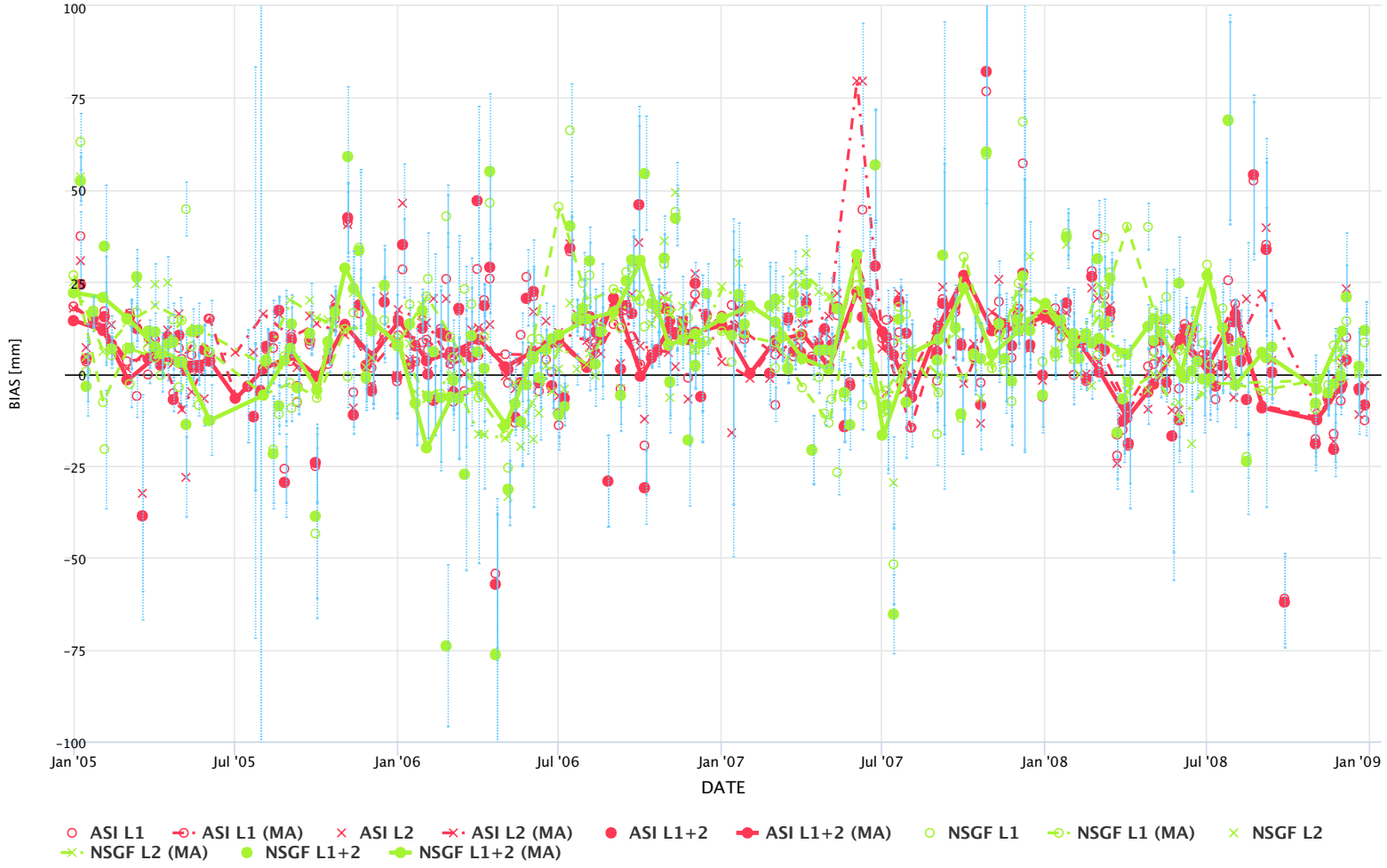
Station Systematic Error PP

MONITORING SYSTEMATIC ERRORS AT ILRS STATIONS



Station Systematic Error PP

Potsdam 7841



Station History Change Log Query

http://geodesy.jcet.umbc.edu/sch_sci_query/

Station History Log Query - Results

Query Result

[SELECT DISTINCT * FROM HST WHERE STATION_CDP_NO='7841' ORDER BY DATE, TIME]

Get data file

DATE	TIME	STATION_CDP_NO	SOD_NO	SCH	SCI	HST	DATA_IMPCT_FLG	SUBSYSTEM	DESCRIPTION
2003-01-01	0	7841	8701	1	0	0	0	0	Start configuration: PMT H 5023 Tennelec TC454 discriminator SR620 time interval counter 50 ps (FWHM) laser (532nm) GPS time receiver HP 58503A Vaisala PT 200 meteo sensors
2003-01-01	0	7841	8701	0	1	0	0	0	standard configuration with SR620(PMT H5023 @1.6kV, TC454, SR620,single pe)
2003-05-30	0	7841	8701	0	0	1	1	04.01	Daylight filter (0.4 nm FWHM) introduced
2003-05-30	0	7841	8701	2	0	0	0	0	daylight filter (0.4 nm FWHM) introduced
2004-02-19	0	7841	8701	0	0	1	2	06.01	A031 Event timer replacing SR620 time interval counter
2004-02-19	0	7841	8701	3	0	0	0	0	A031 Event Timer replacing SR620 time interval counter
2004-02-19	0	7841	8701	0	2	0	0	0	new standard configuration with Event Timer (PMT H5023 @1.6 kV, TC454, A031ET, single pe)
2004-09-06	0	7841	8701	0	3	0	0	0	configuration for high satellites (AD 230 SPAD, TC454, A031ET, Single pe in SPAD Geiger mode)
2004-09-06	0	7841	8701	0	4	0	0	0	secondary configuration for high satellites (AD230 SPAD, TC454, SR620, Single pe in SPAD Geiger mode)
2008-10-26	0	7841	8701	0	0	1	1	04.01	Daylight filter replaced by same type and FWHM
2011-05-01	0	7841	8701	0	5	0	0	0	kHz laser, Event Timer A032-ET, SPAD MPD-1CTC for secondary configuration
[illegible]									
2016-03-23	12	7841	8701	0	0	1	1	05.02	Repaired pump diode for external amplifier and new coupling fibre installed, maximum output power 530 mW
2016-05-24	14	7841	8701	0	0	1	0	04.01	Optical components of telescopes cleaned (negative achromat Tx, entrance window and coupling mirror Rx)